THE Soybean Digest

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IN THIS ISSUE

The Subsoil is Pay Dirt, too!

There's profit in that subsoil—if you go after it! It's rich in elements essential to healthy crop growth. It's the storehouse of moisture during dry spells.

But you have to break up plow pan and the colloidal silt layer before plant roots can penetrate deeply more easily . . . and still get plenty of air. You have to loosen up that subsoil to increase its water-absorbing capacity.

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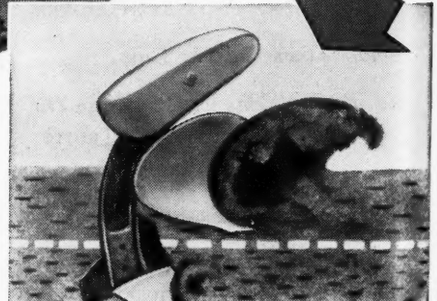

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GROWERS SHOULD STORE MORE SOYBEANS

Current indications point toward the largest soybean acreage in history, primarily because of the unfavorable weather conditions throughout the soybean production areas. Inability to get into fields during the early part of the season, reduced small grain acreages, and flooding out of other crops have all contributed. With favorable growing weather during the summer months, one of the largest soybean crops ever is apparently in store for us this year.

During the war years we have developed a system of marketing soybeans which is not conducive to stable and favorable prices to the grower. Soybeans have been moving to market in one small portion of the year—they have been going directly from the combine to the elevator and thence to the processor. There has been very little farm storage of soybeans—for the crop is heavy, requires rather tight and well braced bins. Those bins have not been available on farms, and no material has been available to build them. It is now time to give serious consideration to the provision of farm storage for a good share of the 1947 crop of soybeans.

The 1947 edition of the *Soybean Blue Book* carries figures showing the average prices of No. 2 soybeans, by months, from 1923 through 1943. Those figures are here reproduced in graph form, indicating that over the 20-year period between the first collection of soybean statistics and the beginning of the war and the consequent price controls, the lowest prices for soybeans came in November, and the highest prices came in June. Over that 20 years the average increase in price during the 6-month period was 32 cents per bushel. The man who has repeatedly stored his beans has profited thereby!

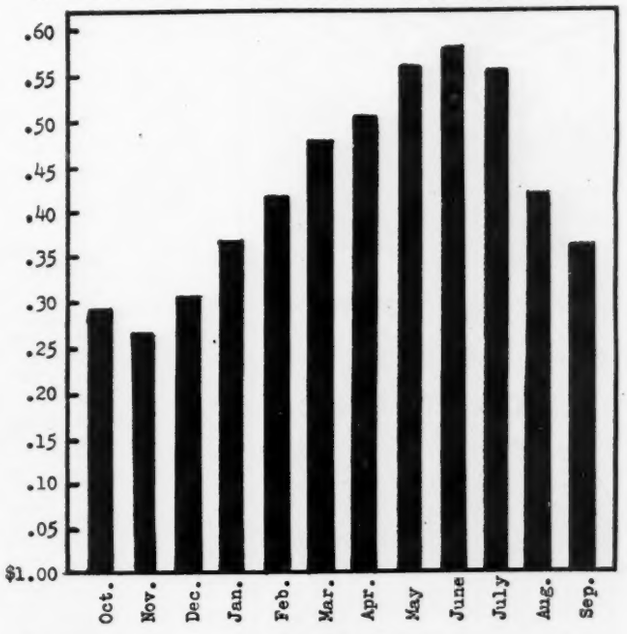
No system of marketing wherein the major portion of a crop is dumped on the market in a short period of approximately 6 weeks will ever yield maximum returns to the grower. The local grain dealer is swamped with beans—his only method of discouraging the deluge is to drop the price. The processing plant can handle only so many cars and truck-loads per day—its entire operations are now disrupted and it is forced to unload beans on 24-hour schedules. When such a deluge arrives, the price is forced down.

The grower of soybeans would benefit materially by providing storage capacity on his farm for at least half his crop. The grain dealer could do a much better job of handling and selling if he could have a longer period of time in which marketings were made. The processor would benefit materially—his facilities would not be overtaxed, his inventories and investment would be held down, his chances of operating over a long period of time would be better, the uncertainties would be lessened.

Soybeans, if low enough in moisture when placed in the bins, do not deteriorate in storage. Except that they take tight and strong bins, they are easily stored. Study the graph on this page soybean prices by months, then start planning now for the handling of your 1947 crop!

WE NEED MORE FARM STORAGE FOR SOYBEANS.

Average Monthly Prices Received by U. S. Farmers for No. 2 Soybeans, 20-Year Period 1923-23 through 1942-43



Source: Soybean Blue Book, compiled by Bureau of Agricultural Economics.

A Timely Article Recent disastrous floods in parts of the Midwest which have again swept away uncounted tons of our best topsoils give point to the article on erosion by Dr. G. N. Browning in this issue. "Do Soybeans Cause More Erosion than Corn?" is a realistic comparison of the two crops in their effect on soil erosion.

When it comes to the soybean's relationship to soil problems, the crop has in the past suffered much from uncritical friends who oversold it as a legume and cure-all for farm ills. When it failed to perform accordingly, some growers have been tempted to blame the soybean for all troubles arising out of a rotation though other crops were in reality as much or more to blame.

The soy *is* a legume. But it also is a row-crop in large production areas, and that has caused some confusion. Soybeans are probably no more, and no less, an erosion hazard than all other row-crops. But we must treat them as a row-crop, even though they are one that pays a special dividend in the form of added nitrogen.

You will find the article by Dr. Browning on page 10 worth careful reading.

Just in Passing . . . You'll be hearing more about "azlon" as time goes by. Clothing made from soybeans may seem like a Walt Disney fantasy to many people, but it is approaching reality. The Drackett Co. is erecting a plant where a soy protein textile fibre will be produced. It will be sold under the trade name of "azlon." Robert A. Boyer tells us about the product in this issue.

GROWERS

Indiana Varieties

Recommended soybean varieties for Indiana are listed and discussed in a new circular just off the press. This is *Indiana Soybean Variety Tests and Variety Recommendations*, Purdue University Circular 322, by A. H. Probst of the Bureau of Plant Industry, and G. H. Cutler of the Purdue Experiment Station.

The recommendations are made as a result of the work done between 1938 and 1945 at the 13 variety test plots in the state. Varieties recommended are shown on the accompanying map. Also Ottawa Mandarin is a very early variety recommended only on muck soils in northern Indiana where plantings cannot be made until June. And Kingwa is a black-seeded hay variety grown in southern and southwestern parts of the state.

—Courtesy Indiana Experiment Station

Soys and Vetch

A "rotation" of soybeans, soybeans and then more soys with an occasional crop of vetch or Austrian winter peas turned under would not work on all soils. Yet this "rotation" produces some good crops of soybeans on Arkansas delta lands, according to Andrew Hirt, cotton and soybean producer at Pine Bluff, Ark.

The editors wrote Mr. Hirt for information concerning his methods. He kindly wrote the following in response to their letter:

I will say that I have been raising soybeans every year for a number of years on the same ground, with a crop of vetch or Austrian winter peas turned under every 2 or 3 or 4 years. Direct fertilization seems to increase yields little if any and is not practiced.

This rather unorthodox practice was prompted by several factors:

1—Our government's plea for soybeans through the early war years.

2—The lack of labor to chop and pick the cotton crop which before 1940 was our main crop.

3—Our operation, aside from hoeing and picking cotton, was 100 percent mechanized, the fields were large, the land being an alluvial sandy loam with just enough slope for proper drainage, the fertility level was fair and the pH was near neutral.

Since I had been raising soybeans since 1938 for green manure these factors pointed to the one crop—soybeans. Since 1941 the soybean acreage has been between 300 and 500 acres, while the 1946 cotton crop was exactly 78 acres.

The varieties, Ogden and Volstate, which seem to yield as well as any I have tried, are planted flat in 38-inch rows (as a matter of convenience) any time from April 20 to June 20. They are given from two to four cultivations. Combining of the Ogdens usually runs from October 3 to October 20; and the cutting of the Volstates from October 20 to 30.

SCIENTISTS
MAY OBJECT

Soil scientists, I am sure, will shudder if they hear of this program. In fact I detected some slight shudders in Dr. W. J. Morse of Washington, D. C. and in Dr. Paul R. Henson and Mr. Carr of the Southern Regional Soybean Laboratory at Stoneville, Miss., when they visited us last fall while we were cutting beans and were informed of the rotation or rather the lack of rotation. Seriously though, as far as I can tell, soil fertility has not suffered nor have diseases or insects been a problem.

In 1946 in spite of a very late planting date on most acres and 6 weeks during July and August when no rain fell the average yield on the 460 acres planted was 19 bushels per acre. This I believe is slightly higher than the average yield per acre through the years from 1940 through 1946. Bean yields immediately following vetch are higher than they were in the beginning.

This procedure is not a common practice in this part of the state. In fact, we do not have a great many soybean growers here. I think this is due to the fact that in 1943 there was a big acreage of beans planted and we had no rain during July and August. No pods set on and most growers cut the crop for hay, then quit soybeans. I was "jittery" also and cut

150 acres for hay, and it made exactly 1 ton to the acre. Then on the first day of September we did get a rain, the pods started to form and I combined 10 bushels per acre on the remaining 300 acres.

Please understand that I am not advocating this lack of rotation on average soils as a general practice. I know full well that over a long period of time it certainly would be harmful.

And if my conscience gets to hurting me because of soil depletion I will wait until beans are cheap, as they probably will be, then I will raise a crop and turn them under while green. I will plant vetch that fall and turn it under the following spring. These large additions of nitrogenous organic matter with the subsequent liberation of other plant nutrients will immediately restore the productivity until it is comparable to near new soils; and this rejuvenation lasts for a number of years.

Then I will have repaid, at least in part, what I have taken out. I know this because I have done this very thing before. And here in the delta land of Lincoln County, Ark.—it works.—Andrew Hirt, Pine Bluff, Ark.

Champaign Still Top

Illinois soybean production for 1945 and 1946 is reported in *Illinois Crop and Livestock Statistics by Counties* recently released by the state's crop reporting service.

County totals are included for soybeans harvested for beans including acres, yield per acre and total bushel production; also acreage for all purposes, soybeans harvested for hay and plowed under, pasture, etc.

Champaign County is still the state's (and nation's) leading soybean county. Production in 1946 was 3,928,500 bushels. Christian County was second with 3,190,000 bushels. Eight Illinois counties produced between 2 and 3 million bushels of soybeans last year; and 15 grew between 1 and 2 million bushels.

Total Illinois production in 1946 was 75,036,000 bushels as compared with 75,200,000 bushels in 1945. Average per acre yield for the state last year was 23.5 bushels compared with 20 bushels the year before.

LETTERS TO THE EDITOR

"Substantial" Foods

A United Press dispatch under date of April 26 quoted Dr. David B. Dill, professor of biochemistry of Harvard University, to the effect that "the people of occupied Europe need more meals of meat and potatoes instead of the diet of 'vitamin pills and soybeans' being fed them."

The UP dispatch further quoted Dr. Dill as saying that American ignorance "has led us to prescribe vitamins and soybeans for these occupied countries when the real deficiency in most of these countries was the quantity of substantial food . . . particularly bread, potatoes and meat."

The editors of the *Soybean Digest* wrote Dr. Dill, requesting an explanation of his apparently derogatory remarks concerning the use of soy foods in Europe. The following letter is in response:

To the Editor:

. . . Referring to newspaper reports of a speech I made at Philadelphia some weeks ago. I have not seen these reports. . .

I spoke from first-hand observation, having been in the Army Air Forces and in the Quartermaster General's office during the war. It was part of my responsibility to observe the likes and dislikes of soldiers and I can assure you that soldiers objected to food products with unfamiliar flavors including those associated with soybeans. These observations were made not only in this country but also in the Pacific and North African theatres.

During 1945 I spent 7 months in charge of a technical mission to Germany. If you will look through the files of *Science* for November 1946 you will find a German report which is in harmony with my point of view, viz that the great need in Europe today is for calories.

The idea that calories and palatability of foods are more important in world feeding than vitamins and protein quality is not universally accepted in the Army nor among my colleagues in the American Institute of Nutrition. But many are swinging to that point of view having seen that vitamin and protein deficiencies in Europe are less striking in end results than is caloric deficiency. The latter first manifests itself by decline in productivity rather than by decline in body weight, as is shown by the German research referred to above.

It is a worthy ambition to employ such a nutritively well-balanced food as soybeans for human feeding but one should not fail to take into account human frailties. Nutritionists have tried for years to change eating habits but without much success in adults: witness the attempts to feed corn to the Belgians in World War I and the continuing but unsuccessful campaign to substitute whole wheat for white flour in this country.

I don't dispute your statements regarding the upswing in soybean production although from an academic point of view I am inclined to class soybeans with legumes rather than with grains.—D. B. Dill, Harvard University, Boston, Mass.

for 27th Annual Convention American Soybean Association, Columbus, Ohio, September 4, 5 and 6

Initial plans for the 1947 convention of the American Soybean Association at Columbus, Ohio have been laid by the convention committee, which held its second meeting in Columbus May 13.

The Deshler-Wallick Hotel will be convention headquarters. Sleeping accommodations will be available there for all members desiring them. Other Columbus hotels will also have facilities available. The main sessions will be held in the Ballroom of the Deshler-Wallick, and the exhibits by organizations serving the soybean industry will be on the mezzanine floor of the same hotel.

A field trip to the Madison farm of the Ohio State University is scheduled for September 4, with transportation to be by bus, and to be supplied by the Ohio Soybean Processors. Busses will leave the hotel at regular intervals. Bus transportation should be arranged at the registration desk on the mezzanine floor. The groups will return to the Ohio State University campus at noon for lunch, and will spend the afternoon viewing the soybean work being done there, including the defoliation demonstrations, variety testing, fertilizer applications, etc.

The formal sessions are scheduled for Friday and Saturday, September 5 and 6, at the Deshler-Wallick. The banquet will be held on Friday night.

More details on the program will be available in the July issue, with the complete program to be published in August. Watch for it.

USE THIS FORM

It is not too early to make your room reservations at the Deshler-Wallick Hotel now for the American Soybean Association convention to be held in Columbus September 4-5-6. The form below is for your convenience. Simply fill out, clip out and mail to Deshler-Wallick Hotel, Convention Department, Columbus, Ohio.

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Parlor and Bedroom		"

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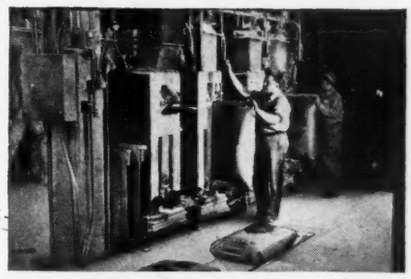
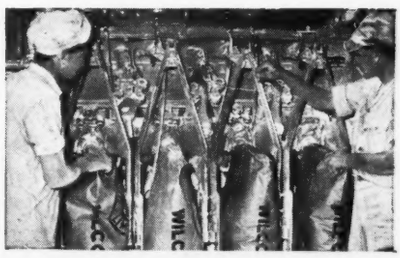
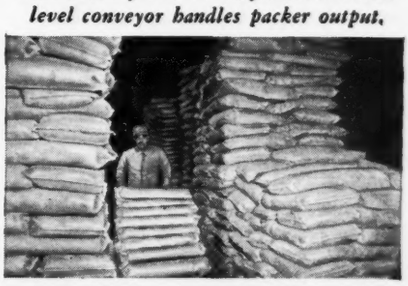


Case History No. 13—Soya Flour: Floor level conveyor handles packer output.

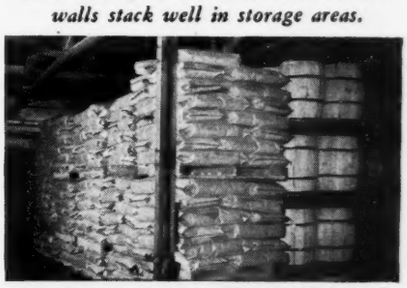


Case History No. 11—Limestone: 4-tube packer permits uninterrupted operation.



Case History No. 14—Chemicals: Multiwalls stack well in storage areas.

Case History No. 12—Soap Powder: One man operates 100-LS packer.



Case History No. 15—Alcohol:Multiwalls save 50% storage space.

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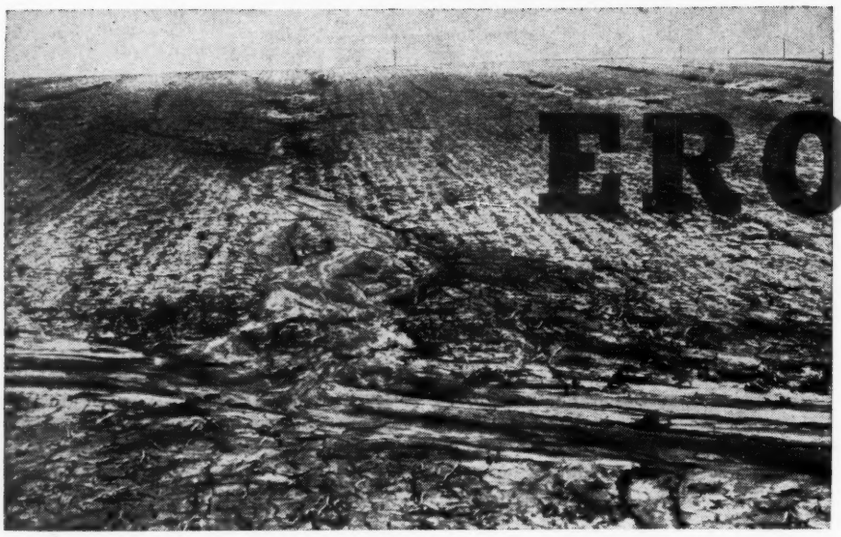


EROSION

Any row crop may cause erosion if improperly handled.

By DR. G. N. BROWNING

United States Department of Agriculture - Soil Conservation Service - Iowa State College, Ames, Iowa. Released by the Soybean Crop Improvement Council.

WE GREATLY increased the acreage of soybeans in the Cornbelt during the war years. Most of our soybeans are grown on flat land and on gentle slopes. But many acres are still grown on steep slopes.

Soybeans as well as other intertilled crops are an erosion hazard when grown on sloping lands. We should use soybeans to replace corn in the rotation instead of increasing the number of years of intertilled crops.

The real question then is: Are soybeans more of an erosion hazard than corn or other intertilled crops? Studies at several of the federal-state soil conservation experimental farms answer some of these problems. They also show methods of controlling erosion the year soybeans are in the cropping system. Let's examine some of these results.

At the Bethany, Mo., Soil Conservation Experimental Farm erosion under soybeans drilled solid was about two-thirds that from soybeans planted in 42-inch rows. The soil was a Shelby loam on 8 percent slope. They also found that soil losses from soybeans grown in rows were about the same as from similar areas in corn.

We started studies in 1944 at the Iowa Soil Conservation Experimental Farm to see if method of planting soybeans affects erosion. Runoff and erosion from corn and soybeans were also compared. In 1944 we found that erosion from corn listed up and down hill was about three times as high as from soybeans planted in the same way. Erosion from soybeans drilled solid in 7-inch rows was less than one-half that when they were in 40-inch rows.

We found contouring reduced runoff and erosion. The difference in erosion between contoured corn and soybeans was less than when the rows run up and down the hill. Contouring corn decreased erosion by 80 percent; soybeans when listed in 40-inch rows by 65 percent, soybeans surface planted in 40-inch rows by 33 percent and soybeans drilled in 7-inch rows by 13 percent. Soybeans listed on the contour caused 42 percent less erosion than corn planted the same way. When the rows were up and down hill erosion from soybeans was 28 percent of that from corn.

In 1945 oats with a sweet clover catch crop were seeded on the corn and soybean land. Runoff and erosion from oats were about the same from land planted to corn or soybeans. Oats after soybeans drilled solid gave 15 percent less erosion than when oats followed soybeans planted in 42-inch rows. The sweet clover catch was plowed down in 1946 and corn and soybeans planted. We shouldn't put too much faith in 2 years' results on any one soil typed. It does show though that tillage practices, methods of planting and type of soil affect the amount of erosion under soybeans.

RESIDUES AFFECT EROSION

Many acres of soybeans are cut for hay. This leaves the soil unprotected and loose during September and October. Heavy rains frequently occur at this time. Erosion is serious under these conditions. It is also serious when corn is removed for silage and the land is bare. Seeding wheat, barley or other small grain soon after the soybeans are cut for hay will reduce the erosion hazard by about one-half that from land left bare over winter and seeded to oats the following spring.

Fortunately from the erosion standpoint most of the soybeans in the Cornbelt are harvested for seed. Before harvest time the leaves fall to the ground. Stems with the pods are still standing. These protect the surface soil from the beating action of raindrops. The soil surface is not sealed and water penetrates rapidly. Erosion is much less of a hazard under these conditions than when harvested for hay.

The soybean seed crop is usually harvested with a combine late in the fall. If the straw is well spread at harvest time, erosion will not be serious during the winter and spring. Oats usually follow the soybean crop. Disking the seedbed for oats covers much of the residue. That mixed with the surface ⅔ inches of soil and that remaining on the surface allows water to penetrate the soil quickly during rains. The erosion hazard is decreased.

We see many soybean fields where the straw is raked and burned in the fall or spring before plowing. This leaves the soil bare. Erosion is increased. Nitrogen is lost. Organic matter needed to help maintain soil tilth is destroyed. There are reasons for burning the soybean straw. But there are more and better reasons why we should not. It is practically impossible to plow land where the straw has not been spread. The answer is more straw spreaders on combines. It costs money to rake and burn the soybean residue. In addition, valuable nitrogen and organic matter are lost. It's good business to save the soybean straw as well as other crop residues.

Do Soybeans Cause More Erosion Than Corn?

• Not if they are compared with corn grown in the same place in the rotation, the same method of planting is used and the residues are returned to the soil, the author says.

PLACE IN THE ROTATION

The place that soybeans occur in the rotation influences the amount of erosion that occurs. Soybeans usually follow corn. If we are to get a true picture of soybeans as an erosion hazard it then should be compared with second year corn.

Studies at several of the Soil Conservation experimental farms show that erosion from second year corn after meadow is about 50 percent higher than from first year corn. Soil tilth deteriorates rapidly after meadows are plowed and planted to an intertilled crop. Much of it is gone by the end of the year of corn. This is why erosion increases on second year corn. We can also expect more erosion from soybeans following corn than from first year corn after plowing down a meadow crop. This is one of the reasons for the common opinion that soybeans cause more erosion than corn.

At the McCredie Missouri Soil Conservation Experimental Farm a comparison was made of erosion from soybeans when they followed corn and when they followed meadow. In the 4-month period, May through August, *drilled soybeans allowed about 68 percent as much erosion as corn when both followed corn.* When corn and soybeans were grown following meadow, erosion from soybeans was 74 percent as much as from corn.

It appears then that serious erosion hazards often credited to soybeans are not the fault of the plant itself but the place where it is put in the cropping system.

SOYBEANS AND SOIL TILTH

What about the effect of soybeans on soil tilth? It is well known that soybeans leave the soil loose. Heavy clay soils after cropping for several years become cloddy and hard to work. Soybeans improve the tilth of these soils. How? We don't know all the answers. There are probably several reasons. The soybean plant has a less extensive root system than corn. It requires more water to produce a pound of the soybean plant material than a pound of corn plant. The higher water requirement and the less extensive root system reduces the moisture content of the soil more than under corn. We found the moisture under soybeans 6 percent lower than under corn grown under similar conditions. The soil is often very dry in July and August under soybeans. Rains follow. Large clods are broken down into smaller granules. Freezing and thawing has the same effect. That is why we fall plow heavy soils to improve soil tilth.

Yields of corn following soybeans on heavy soils are generally several bushels higher than corn following corn. Part of the increase may be credited to improved soil tilth. The soybean is a legume. If inoculated, it gathers nitrogen from the air. The amount of nitrogen returned to the soil depends on how the straw is handled. On the average we can expect the soybean to fix as much or more nitrogen than needed by the plant. A good corn crop will take 80-100 pounds of nitrogen from the soil. We can then credit part of the increased yields of corn following soybeans to the nitrogen added by the soybean plant.

On light silt loam soils soybeans have a harmful effect on soil tilth. Light silt loam soils run together badly but usually are not cloddy. They are made up of smaller soil granules. Soybeans cause a breakdown of large soil granules into small individual particles. When the soil is made up mostly of small individual silt particles, the soil pores are very small. Water and air move slowly through small

Soybeans need not cause serious soil erosion. For conservation of soil, contouring and terracing are essential on sloping land.

pores. When conditions are not favorable to movement of air and water, crop yields suffer.

Light silt loam soils do not run together as badly under soybeans as under corn. Hard driving rains break down soil granules and cause the soil to run together. Soybeans have wider leaves than corn. Soybeans give quicker and more protection to the soil from the beating action of raindrops than corn. The soil under soybeans is covered with leaves by late summer. This protects the soil surface from the beating action of raindrops. Soil microorganisms also increase soil granulation. Most of the nodules on the roots of soybeans drop off at the end of a dry period followed by rain. This furnishes a readily available supply of organic material to bind soil particles together into soil granules. This doesn't happen under corn.

CHARACTER OF THE SOIL

Soils vary in the ease with which they erode. Some soils have good tilth at the surface and don't break down and run together under the beating action of hard driving rains. These soils resist erosion. Other soils have poor structure because of how they were developed or because too many row crops have been grown without enough grasses and legumes in the cropping system to maintain stable soil structure. These soils do not resist hard driving rains but go into suspension and seal the soil pores. When water cannot go into the ground, high runoff and erosion can be expected. On the silt loam soils the surface is probably more important than any other part of the soil in influencing runoff and erosion.

We shouldn't fail to recognize though that some soils have heavy clay subsoils which limit downward movement of water. After the surface soil has taken up all of the water it can hold, then a tight subsoil limits the downward movement of water. If soybeans have loosened the surface of a soil with an impermeable subsoil, erosion may be very serious if hard driving rains continue after the surface is saturated. If the subsoil is open, loosening of the surface may actually increase the amount of water that goes into the soil. Erosion under these conditions will be decreased.

Everything considered, there is no question but that soybeans like all other row crops are an erosion hazard. The information available up to now would indicate though that on the average soybeans are not more of an erosion hazard than corn. This assumes that they are compared with corn grown in the same place in the rotation; that the residues are returned to the surface to protect the soil and that the same method of planting is used.

a MODERN SHIRT from the Ancient Soybean

By ROBERT A. BOYER
Soybean Research Council

TWO OF THE OLDEST and most useful materials in the world are the soybean and wool. Since the beginning of recorded history, these materials have played a major part in filling man's basic needs for food and clothing. The soybean has been the source of a nutritious protein and fat for over half the people in the world, and wool has been a highly prized textile fiber by almost everyone, not only for its warmth but also for the utility and beauty of its fabrics.

One may wonder why two such different materials, one primarily a food and the other a textile fiber, are mentioned together. What do they have in common? While it is true that up to the present time, these products have played their roles in widely divergent fields, there are indications now that this will not long be true—that the soybean is about to serve man not only as a food but also as a textile material. It is the purpose of this article to explain just where and how the soybean may someday become an important factor in the textile industry.

Today in modern business it is becoming more and more of an axiom that industry must actively support scientific research in order to remain profitable and to continue in competition. Every year many products and businesses fade into oblivion because they have failed to take advantage of the benefits of science. The average person now takes it for granted that there will be continual improvement in the products that he uses every day. For instance, he expects yearly improvements in his car, radio, home appliances; and periodic changes for the better in the design of his home, office, and even his city. *As soon as progress stops in industries, they wither and die.*

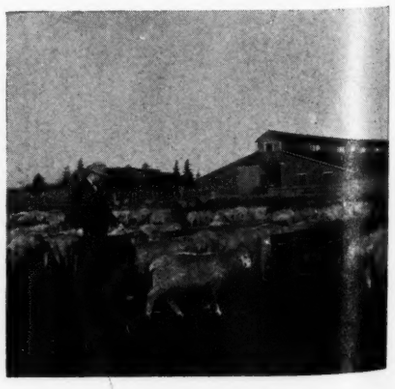
Like every general rule, this one also has exceptions and a major exception seems to be the wool industry. Wool is a product that for thousands of years has been used every day by almost every person in the world, and yet the wool industry is one that supports relatively little research and has had very little change throughout these thousands of years. For instance, wool is produced today in almost the same manner as in ancient times and at about the same efficiency. An average sheep still produces the same quality and quantity wool (less than 10 lbs. a year) as the sheep of Biblical days. The conversion of raw wool to finished fabric has seen an occasional technical advance, but many of the methods in use today in spinning and weaving wool are hundreds of years old.

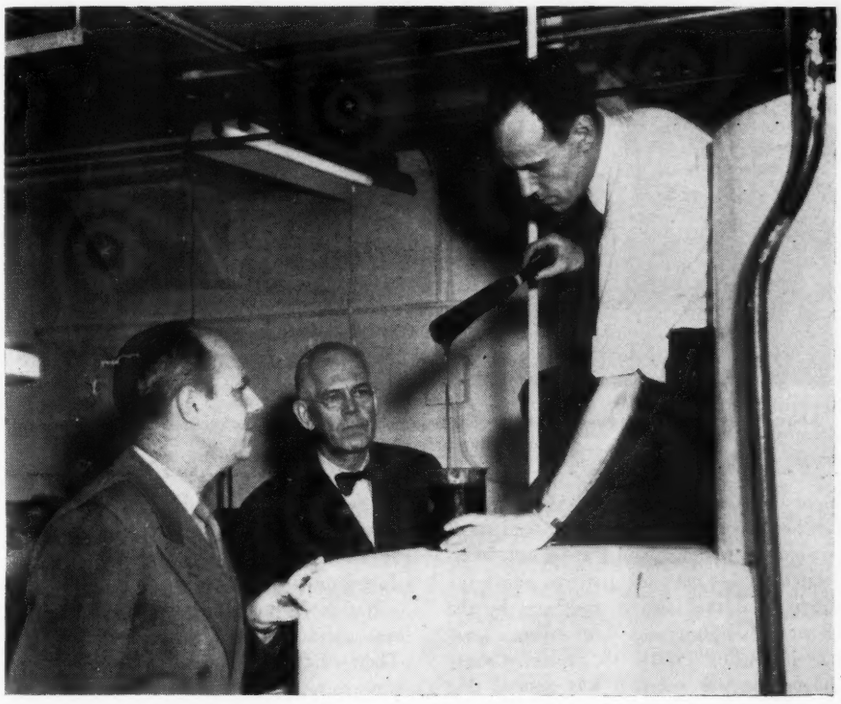
When viewed from an engineering standpoint, wool is one of the most remarkable materials in the world. The fact that wool today is still used by almost everyone despite the lack of technical progress and in spite of the fact that it is one of the most expensive textile fibers, is eloquent testimony to the excellence of this product.

Because of the high cost of wool and silk there has been a great deal of activity since the turn of the century by scientists interested in the textile industry in an endeavor to find a lower cost textile fiber which would have all the desirable qualities that can now be found only in wool and silk. As a result of this research, tremendous industries have been developed which are now producing synthetic fibers such as viscose and acetate rayons, nylon, and many others. No one will deny that these developments have been valuable and that they are serving to play an important part in the textile industry today. Nevertheless none of these developments have replaced or even diminished the use of wool in an important way.

The reason for this is evident when it is realized that our most valuable and most expensive textile fibers, such as

Wool from sheep has been one of man's prized clothing products since Bible times.





The viscous fluid is liquified soy protein which will shortly be forced through tiny holes in a spinnerette at the plant of the Drackett Co. in Cincinnati to emerge as soybean fibre. Robert Boyer (left), director of scientific research and H. R. Drackett, president, inspect a batch of this liquified protein.

wool, silk, and furs, are of animal origin, and that therefore these fibers are protein material. In contrast to the animal fibers there are the lower cost vegetable fibers such as cotton, flax, ramie, and the man-made vegetable fibers such as rayon. All of these vegetable fibers are of a cellulosic nature. It has finally become apparent that cellulose fibers, although they are much cheaper than the protein fibers, do not meet the performances and requirements that we demand of garments made from animal protein fiber. We therefore have been forced to use the expensive animal fibers (mainly wool) to achieve the wearing qualities, warmth, and draping characteristics which we want in our better fabrics.

It would seem natural therefore that the textile chemists in their efforts to make a superior synthetic fiber would attempt to use a protein material rather than a cellulose material.

No serious attempt to produce a man-made protein fiber was made until about 15 years ago. The reason for this is readily apparent—there was no economically practical protein raw material available to the scientists with which to work, that is, until the advent of the soybean industry in the United States. True, a few animal proteins such as milk casein and gelatin were studied, and in fact, there has been a fiber developed which is now in commercial use made from milk casein.

However, the economics of animal proteins, when compared to vegetable proteins such as soybean proteins, are not very good. It must be remembered that all animal proteins are the product of the animal's digestive processes and that a very large part of the food consumed by any animal is converted to energy rather than to solid body or protein material. In fact the conversion of food to solid protein material is considerably less than 10 percent in most cases. Along with this low conversion efficiency there is usually involved long periods of time before the solid protein material can be made available for any industrial operation. Furthermore, most animal proteins in their natural state contain large amounts of water, and in this wet state, as everyone knows, they spoil or decompose readily. This means that a large scale processing operation has to employ refrigeration extensively.

In addition these wet proteins have to be processed very close to the scene of their production if costs are to be kept down. The dairy industry with its local milk depots, cheese and butter factories is an example of this. Because of these facts, animal proteins, at least up to the present time, have been so expensive that they have been considered impractical as raw materials for industry. Casein, gelatin, wool, and silk are the chief exceptions but even in their particular fields they are considered "expensive."

Here is where the soybean enters the picture because the soybean has made available for the first time to industry an almost unlimited source of low-cost protein.

Because of the superior methods, which were developed in this country for extracting soybean oil, soybean oil meal became available which was extremely rich in protein and in which the protein had not been ruined by exposure to too much heat or other improper processing techniques. Here then was a low cost protein that could be readily extracted, purified, dried, stored, and otherwise put in a form practical for an industrial raw material.

Since the appearance of this material there has been underway an extensive investigation into the possibility of making a fiber from soybean protein. Today this is approaching reality—a soybean protein textile fiber, the first protein fiber to be made commercially that does not stem from an animal origin.

This fiber has been produced for several years on a pilot plant basis. Today a new plant, the first of its kind in this country, is under construction which will produce this soybean fiber in large volume.

Exhaustive testing of this new fiber has been quietly under way for several years in an effort to determine exactly how it performs when mixed with other textile fibers and woven into various types of fabrics.

As a result of this work, the textile industry has become highly interested because it has been found that fabrics made from a blend of soybean fiber and rayon or cotton, have a "hand" that is unique; a "hand" in fact that cannot be obtained with any other fiber—even wool.

Although the fiber in its present state of development cannot be considered a true wool substitute, it does have, for instance, the warmth which is characteristic of animal protein fibers and also an ability to improve the draping properties of fabrics in much the same manner as wool.

A great deal of work remains to be done, but already enough is known about soybean fiber to be able to predict for it a bright future. The Federal Trade Commission, recognizing the potential and increasing importance of man-made protein fibers, last year adopted for them the generic name "Azlon," following the same pattern of using the word "Rayon" for all man-made cellulose fibers.

And so, as time goes on, it will become more and more a common occurence, when purchasing one of the popular new sport shirts that has the *warmth* and *appearance* of wool but the *softness* of cotton flannel, to see on the label "50 percent Rayon, 50 percent Soybean Azlon." This then will truly be "A Modern Shirt from the Ancient Soybean"!

Small Town Solvent Unit

Above is the Roach Soybean Mill at Plainfield, Iowa, a solvent extraction unit designed for comparatively small operations.

The small solvent extraction plant of Roach Soybean Mills, Inc., at Plainfield, Iowa, went into continuous operation some months ago, and is now engaged in its first full year of production.

With the completion of this plant and its successful operation in this little Iowa town of a few hundred people, a dream of the owners and of engineers at the Iowa Engineering Experiment Station came true.

The college engineers dreamed of a small soybean processing plant that could be operated efficiently and safely in a small town. They wanted to add to the number of practical enterprises available to the small community.

This was also the hope of J. Roach Sons, Inc., feed mixers and grain dealers at Plainfield. They were interested in setting up a small soybean processing plant to be operated in conjunction with their feed business, at Plainfield and in three other towns in the immediate territory.

Howard L. Roach, the president of J. Roach Sons, and a well known Iowa farm manager, — he is former president of the Iowa Farm Managers Association as well as of the American Soybean Association — has long been interested in farm and small community problems, which are closely interrelated. It has been his desire to return the products of the farm to the farm by the shortest possible route. With soybean acreage increasing greatly in Bremer County during the war years, it was natural that he should become interested in the project of the Experiment Station engineers.

So the Roach firm cooperated with the Experiment Station in setting up the plant and putting it into operation. Over a period of several years the "bugs" have been taken out. Operations are now considered to be entirely satisfactory from a mechanical standpoint.

Dr. L. K. Arnold, Iowa State College engineer in direct charge of the project, told of the plan back in the October 1941 issue of the *Soybean Digest*: "It is felt there are definite possibilities for the proper type of plants in sizes ranging from 5 to 25 tons a day, the smaller sizes to be operated in conjunction with grain elevators or feed mills."

The engineers were inclined to believe that solvent extraction was the coming process because of its greater efficiency in removing the oil. Perhaps they were a little ahead of the thinking of much of the industry on this point.

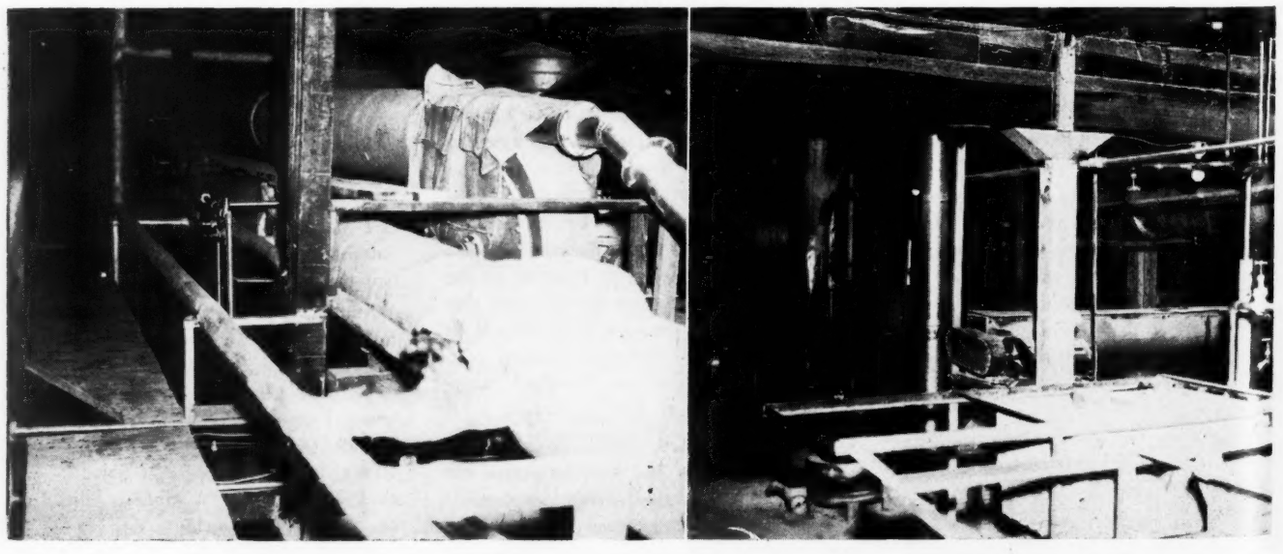
But the solvent plants existing then had real disadvantages for the small operator. They were built only in large units—100 tons capacity was about the smallest. Solvents used were explosive. The operation was especially dangerous in small plants where experienced safety men could not be employed. Only trained engineers could operate the plant, so an overhead was required that was out of reach of the firm with small capital.

The Station engineers set out to design a new unit that would meet the following requirements:

1. It must be practical in small sizes.
2. It must use a non-explosive solvent.
3. It must be simple to operate.
4. It must be moderate in first cost, and
5. It must be economical to operate.

In other words, they wanted to build a plant that could be operated in small towns with small capital. Soybeans need not be shipped long distances to such a plant close

Left, steamheated meal drying unit at the Roach Soybean Mill; at right in the rear you see the meal sacking unit, in foreground the oil filters.



to the source of supply, and then shipped back again in the form of oil meal.

They set up pilot plant studies on the project in cooperation with the Du Pont Co. as early as 1936. The firm established a fellowship for making the studies. Dr. O. R. Sweeney, head of the Department of Chemical Engineering at Iowa State College, and one of the Midwest's recognized chemurgic pioneers, was in charge of the original development work.

The engineers selected trichloroethylene as the solvent because in addition to being non-explosive it is a commercial product available in quantity. It boils at a low temperature (189° F.) and is easy to remove from the oil and meal.

FULLY MEETS EXPECTATIONS

Dr. Arnold says the Roach mill now in operation fully meets expectations. Designed as a 10-ton unit, it is now processing about 12 tons of soybeans daily. Two men operate the plant on each shift. Neither is a trained engineer. Their duties are to watch and lubricate the machinery, tend the boiler and sack and handle the oil meal. Most of the rest of the operation is automatic.

Howard Roach is president of the Roach Soybean Mills, Inc. His son, John, is plant manager. Howard was in charge of setting the plant up and worked with Dr. Arnold in taking the "bugs" out of it while John was in Uncle Sam's Navy. John took charge of the plant when he returned from service in the fall of 1945.

At least three small plants employing trichloroethylene as the solvent are now in operation, though none of them are of the exact design of the Roach plant.

A commercial firm plans to begin production of this complete unit in the near future. From a mechanical and engineering standpoint the plant is entirely successful. Its potential usefulness to the community and to the soybean industry is yet to be demonstrated. Future developments in this type of operation will be watched keenly.

At the present time research men at Iowa State College are experimenting with other non-explosive solvents in an effort to find one that is even more effective than trichloroethylene.

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SOYBEANS IN KANSAS

F. B. Ross, president of the board of trustees for the College of Emporia, points to soybeans as an important Kansas crop.

In 1939 there were no soybean processing plants in Kansas and only 39,000 bushels were produced, says Ross. In 1946, there were eight soybean processing plants in the state, and they paid about 15 million dollars to Kansas growers. Each of the processing plants provides employment and sustenance for from 10 to 30 families.

REVERSION

Chief Problem in the Use of Soy Oil for Edible Purposes

By PAUL T. TRUITT

President National Association of Margarine Manufacturers

From talk before Soybean Conference at Peoria, Ill., Feb. 27-28.

PAUL T. TRUITT

OUR topic, "Problems in the Use of Soybean Oil for Edible Purposes," is broad. Perhaps it is too broad for representatives of our industry to discuss with authority. Nevertheless, the main point which we shall raise applies in some measure to all food products which use soybean oil as an ingredient. My remarks will be made from the viewpoint of merchandising margarine.

The interest of margarine manufacturers in soybean oil research is vital and it may be stated briefly.

The intrinsic values of margarine have been long established. There is no question about its nutritive value, its energy value, its vitamin A content. It has been approved by the American Medical Association, the New York Academy of Medicine, the Bureau of Home Economics and many other scientific and governmental organizations and personages.

TASTE IS OF FIRST IMPORTANCE

In recent years, much improvement has been made in the taste and eating-quality of margarine. Margarine is a food product, unlike many others, which is consumed "as such." It is eaten without any change in its identity or in its taste. When color is added, no change in taste occurs, but eye appeal, by virtue of eating habits, is increased. It is used as a spread on bread just as it comes from the carton, or with color added. Margarine is also used as a seasoning on vegetables and in cooking generally.

A product which must pass these rigid tests several times each day, or every time it is eaten, must be palatable, have an excellent quality, smooth texture, and a clean fresh odor, if it is to receive continued consumer acceptance in any volume.

Margarine as we know it today is far superior to the product of years ago. Advanced technology, modern equipment, improved methods of refining, and the use of higher grade oils have made this possible. As part of this, the use of soybean oil in margarine has expanded greatly in recent years. Soybean oil is now an important oil in the production of margarine. Its use has been expanded to where about one-half of all oil now used is soybean oil.

I should like to give you some figures which will illustrate the vigorous growth of the use of soybean oil in margarine in the past 10 years.

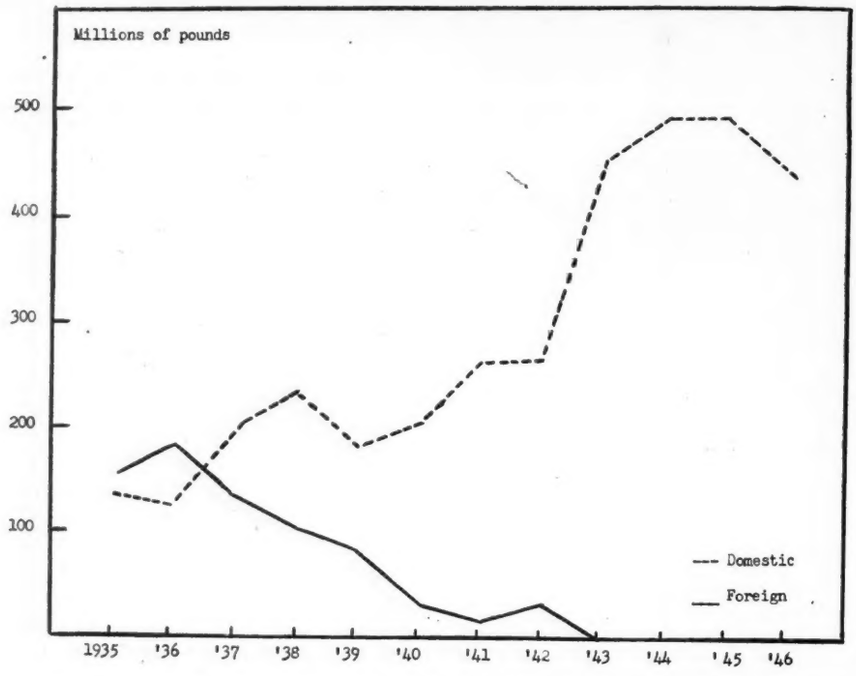
Year	Soybean Oil Used in Margarine (1,000 lbs.)
1936	14,261
1937	31,791
1938	39,885
1939	70,822
1940	87,103
1941	75,634
1942	133,346
1943	198,020
1944	211,105
1945	206,643

Today food is the largest single outlet for soybean oil and margarine is your second largest customer. Further, with an all time high in margarine production, for domestic use only, in 1946 we have an unsatisfied demand for more margarine on the one hand and plant capacity to satisfy that demand on the other. We know that since 1940 the regular use of margarine has more than doubled in this country. The demand today is perhaps equal to twice the amount produced. Margarine manufacturers intend to fully meet this demand as rapidly as the oil supply will permit.

On the whole, but allowing for minor variations, soybean oil is not stable enough for fully satisfactory use in margarine. Yet, we all believe soybean oil is here to stay. The capacity of soybean oil to "revert" to some degree to the taste-characteristics of unrefined oil, and its inability to remain sweet and bland during the shelf-life of margarine, is a most serious threat to post-war margarine sales. By and large, consumers simply will not eat unpalatable food, or food with a poor taste.

Rapid, almost daily turnover of margarine in the grocery stores between 1943 to the present time, has served, temporarily, almost

DOMESTIC AND FOREIGN FATS AND OILS USED IN THE MANUFACTURE OF MARGARINE — Fiscal Years 1935-1946



Domestic and Foreign Fats and Oils Used in the Manufacture of Margarine Fiscal Years 1935-1946 (Thousands of pounds)

Year	Domestic	Foreign	Total
1935	135,349	149,808	285,157
1936	124,824	180,526	305,350
1937	194,047	126,725	320,772
1938	233,302	105,280	338,582
1939	185,435	84,211	269,646
1940	206,480	37,636	244,116
1941	258,091	18,730	276,821
1942	266,934	33,105	300,039
1943	447,055	0	447,055
1944	495,597	0	495,597
1945	498,249	0	498,249
1946	448,632	0	448,632

Source: annual reports of the Commissioner of Internal Revenue, except for 1946 which is from the release of August 29, 1946, from the Commissioner of Internal Revenue.

completely to bypass this threat. Nevertheless the threat is there, and the possibility of damage is very real. The damage will actually materialize when supplies of oil permit the production of margarine to approximate the increased consumer demand. *At that time, margarine must be made from raw materials which will assure a satisfactory shelf-life of as much as 6 weeks.* This is necessary to be certain that the housewife will always get an acceptable product.

Margarine manufacturers consider soybean oil reversion and its causes as the most pressing need for research related to this industry at the present time.

In fact, 3 years ago, this Association considered such research so important that it was placed first on our list of research projects. We set up a 3-year appropriation and started work in 1945 at the University of Pittsburgh under the direction of Dr. Herbert E. Longenecker. We have made some efforts, which so far have not been successful, to expand this work which is now entering its third year. In addition to this work, research on the causes of reversion is going on in the laboratories of margarine manufacturers.

We hope that at this Northern Regional Research Laboratory and elsewhere maximum resources may, without further delay, be applied to discover the cause and cure for soybean oil reversion at the earliest possible date. We should like very much to see definite action follow this meeting.

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SWIFT & CO. PLANT TO USE NEW PROCESS

Swift & Co., has announced plans to build a new plant in Hammond, Ind., which will employ a new process to separate animal, vegetable and marine oils.

The plant will include the first announced application of the Solexol process recently introduced by the M. W. Kellogg Co., which cracks glycerides into fractions differing in molecular weight and structure.

Industries which will use the end products include rubber, textile, soap, cosmetics, paint, linoleum and lubricants.

The plant is expected to be completed next year. M. W. Kellogg has been awarded the contract to install its Solexol process and will also design and construct two other units. Blaw-Knox Co. will also build facilities at the plant for extraction of glycerin from fats and oils.

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CHEMICAL PLANT HEAD

Whitney Eastman, president of the chemical division of General Mills, Inc., has announced the appointment of Hugh A. Hamilton as technical director of the company's new Chemical Plant being built at Kankakee, Ill.

Hamilton is an alumnus of Sioux Falls College and the University of Nebraska. For the past several years he has supervised analytical, experimental, and process engineering Laboratories in the butadiene division of the Cities Service Refining Corporation at Lake Charles, La.

PROBLEMS IN THE USE OF SOYBEAN OIL IN *Industry*

By FRANCIS SCOFIELD
National Paint, Varnish & Lacquer Assn.

From a speech at the Soybean Conference, Peoria, Ill., in February.

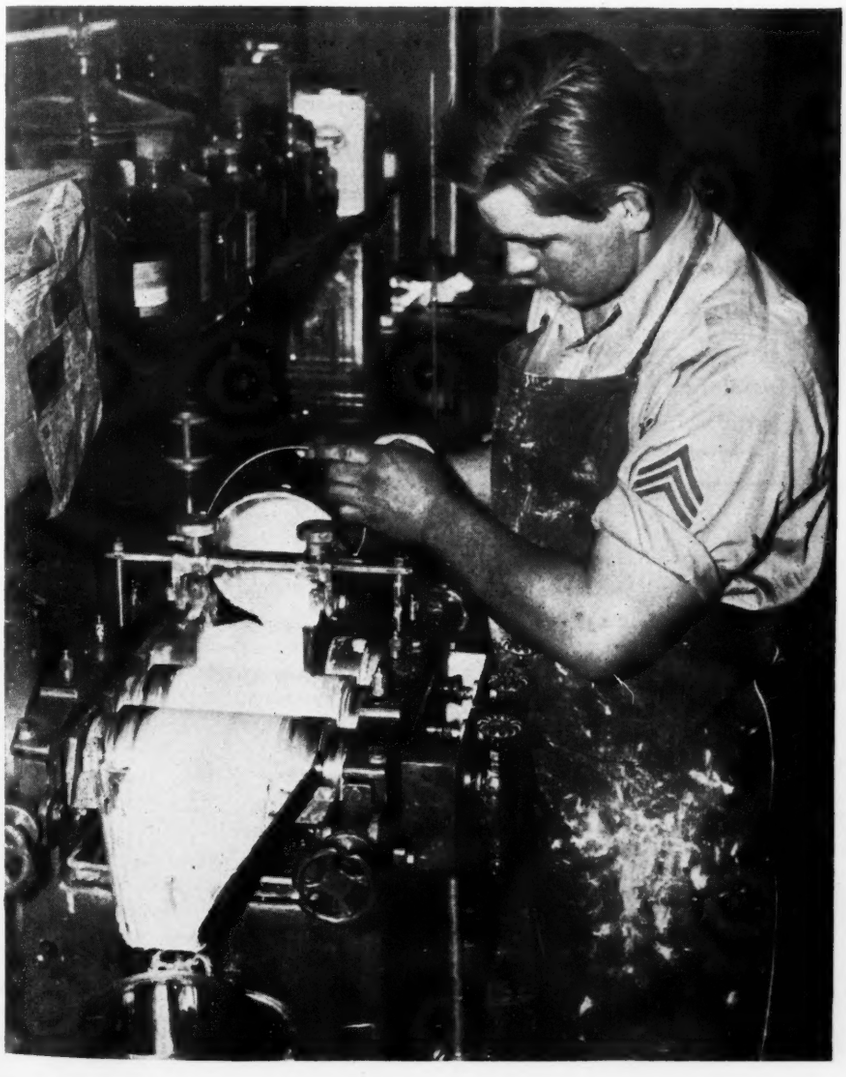
SOYBEAN oil has many industrial uses, being adapted, to some degree at least, for almost all the uses which may be found for a vegetable oil. One of the largest of these uses is in the manufacture of paints and varnishes, and these remarks will deal largely with this field, although much will also apply to other fields as well.

We can think of the uses of soybean oil in two classes. One of these makes use of the fact that soybean oil resembles other drying oils to some degree. We, therefore, attempt to substitute it for some other oil with as little other change in the formulation as is possible. This substitution is largely inspired by the lower cost and greater availability of soybean oil, and is restricted only by the amount that can be tolerated in a given formulation without seriously impairing the properties of the product. Research developments in this field are, naturally, limited, since the only reason for using soybean oil is likely to be its lower cost, and there is not much leeway for research expense. Also, since the market is limited to that which can be stolen from other oils, there is a definite limit on what can be sold, and research will not serve to expand the field for soybean utilization very much.

A second, and certainly more promising, class comprises those uses which take advantage of the fact that soybean oil is different from other drying oils and yields products of different properties. This may result in a coating whose merit is greater for certain purposes than that of any heretofore available, and thus serves to widen the total market for coatings without necessarily stealing from other coatings. In any event, since the use is justified by better service, the low price of soybean oil represents only an additional bonus, rather than the sole justification for its use.

One example of a use of this type will serve as an illustration. Certain alkyds, made from soybean oil, have adequate drying time and such superior resistance to yellowing and premature cracking that they are used in the highest quality interior enamels, with results equal to or better than were obtained by any other materials. This results in an additional market for coatings, since these enamels encourage the use of paint on surfaces which had not heretofore been painted. Other illustrations could readily be added to emphasize the importance of this type of use.

Pigment is ground in soybean oil in a three-roller paint mill at the Northern Regional Research Laboratory at Peoria, Ill.
—USDA Photo by Peter Killian



FUTURE IN INDUSTRY

Some idea of the relative importance of these two categories may be gathered from an inspection of the consumption of soybean oil by the paint and varnish industry during the War. At this time, the use of soybean oil in paints was prohibited, because of the necessity of diverting the maximum amount into edible products. However, certain exceptions were made in the case of products where no adequate substitute was available. It will be seen that these irreplaceable uses amounted to between 3 and 4 percent of the total oil consumption of the paint and varnish industry.

The future consumption of soybean oil by the industry is difficult to prophecy. Before the War somewhat less than 10 percent of the oil used in paints and varnishes was soybean. This proportion was increasing gradually. As a first approximation, it may be assumed that the paint and varnish industry uses about 1 pound of oil for every dollar of sales of its products. During the War this ratio declined, since the preponderance of paints required by the armed forces were relatively low in vehicle, but it may be expected to return now that the War is over. It is as certain as anything can be

that within the next year or two, the paint and varnish industry will be selling more than a billion dollars of products, and using a billion pounds of oil. At the prewar ratio, this will give a market for 100 million pounds of soybean oil, which figures may be regarded as the floor below which consumption is unlikely to fall. The ceiling is set only by the ingenuity and resourcefulness of our research workers in discovering new products in which soybean oil can be used.

Research may be either fundamental, applied, or development. Fundamental research discovers new facts, without regard to their usefulness. Thus fundamental research on soybean oil would deal with its composition and behavior under various types of treatment and would record what changes take place, without regard to whether they are in some predetermined direction. Applied research takes this information and attempts to develop products which may be useful in the manufacture of finished goods. Developmental research takes the products of applied research and studies how they may be most efficiently and economically used in products desired by the consumer.

Developmental research is peculiarly the field of the processor of soybean oil and of the user. They have the consumer contacts who may test out ideas and suggest directions in which further work should proceed.

Fundamental and applied research are much more nearly adapted to research organizations such as the Northern Regional Research Laboratory, and the state experiment stations and universities. Of the two, the fundamental research is the one which is most in need of work. Applied research can be conducted on a trial and error basis without the fundamental facts on which hypothesis may be built, but the procedure is very wasteful of time and money.

We have been operating for years without the answers to a number of important questions. Without these we are groping in the dark, and it becomes surprising how much we have discovered when you consider how much of the background remains to be filled in.

I will enumerate some of the questions for which answers are badly needed. I do not pretend to know for sure, how the research should be conducted. I doubt if anyone does. All we can do is to collect all the information we can, whether it seems relevant to the particular problem or not. When we get enough pieces, the jig-saw puzzle will begin to fall into place.

When a film of oil is exposed to the air, it absorbs oxygen and undergoes an irreversible change from a liquid to a rubbery solid. This reaction continues gradually until the film fails from progressive embrittlement. Although considerable experimental evidence bearing on this phenomenon has been accumulated, and many articles discussing the theory have been written, no one has yet presented a theory which seems to me to describe the process adequately. Thus, the fundamental reaction on which a large industry is based is without satisfactory explanation.

Also, we know with reasonable precision, the fatty acid composition of soybean oil, but we do not have any idea of how these fatty acids are combined into glycerides. Several suggestions have been made as to the glyceride composition of oils, but none has been confirmed by experimental evidence. The Federation of Paint and Varnish Production Clubs has a large scale research program under way for the study of the behavior of various pure glycerides, but unless we know more than we do at present about the glyceride composition of soybean oil, it will be hard to apply what the Federation learns to the intelligent utilization of soybean oil.

ARE WORKING IN THE DARK

Further, the breeders of soybeans need some guidance as to the direction in which they should press their operations. Undoubtedly there are certain glyceride combinations which are more desirable than others from the point of view of the protective coatings industry, but until we know what those are, the breeder is laboring in the dark.

In conclusion, we can summarize my views by saying that the utilization of soybean oil by industry is in its infancy. The capacity of industry to consume soybean oil is limited only by the diverse uses which can be thought up for it. The growers and processors of soybeans can rely on industry to develop these uses if they are furnished with the necessary fundamental information on which to operate, but without this information, the development of new uses will proceed slowly and haltingly, by trial and error, and will never expand to fill the potential market.

A DECADE OF SOYBEAN RESEARCH

By R. T. MILNER[1]
Northern Regional Research Laboratory[2], Peoria, Illinois

TEN years have passed since organized research on the industrial possibilities of soybeans was started in 1936. This, as many will remember, began with the establishment of the U. S. Regional Soybean Industrial Products Laboratory at Urbana, Ill. It was an outgrowth both of the increasing popularity of soybeans as a farm crop and of the farsightedness of many individuals who recognized the industrial potentialities of a crop rich both in protein and oil. We have only to recall the prominent part the soybean played in recent years to recognize the country's good fortune in having men not only with vision but also with the enthusiasm to start soybean research on a sound and practical basis.

Prior to the establishment of the Urbana Laboratory, Dr. O. E. May and Mr. H. T. Herrick had spent much time in laying the groundwork of the research program. In their survey, the objective was to learn from industry what problems should be studied by the U. S. Department of Agriculture and what questions were receiving industrial attention.

Work on the most important problems shown by this survey demanded the attention of both chemists and agronomists, and, with such changes as situations have dictated, has been continued. However, after the establishment of the Northern Regional Research Laboratory, chemical and engineering research was transferred from Urbana to Peoria, but the work has continued without halt.

There have always been more problems, either suggested by others or developed in the course of our work, than there have been hands or money to investigate. But, much has been accomplished and marked progress has been made. This may well be considered, from the standpoint of our chemical and engineering research at this Laboratory, by distinguishing four main fields. Let us call them composition, protein, oil, and processing.

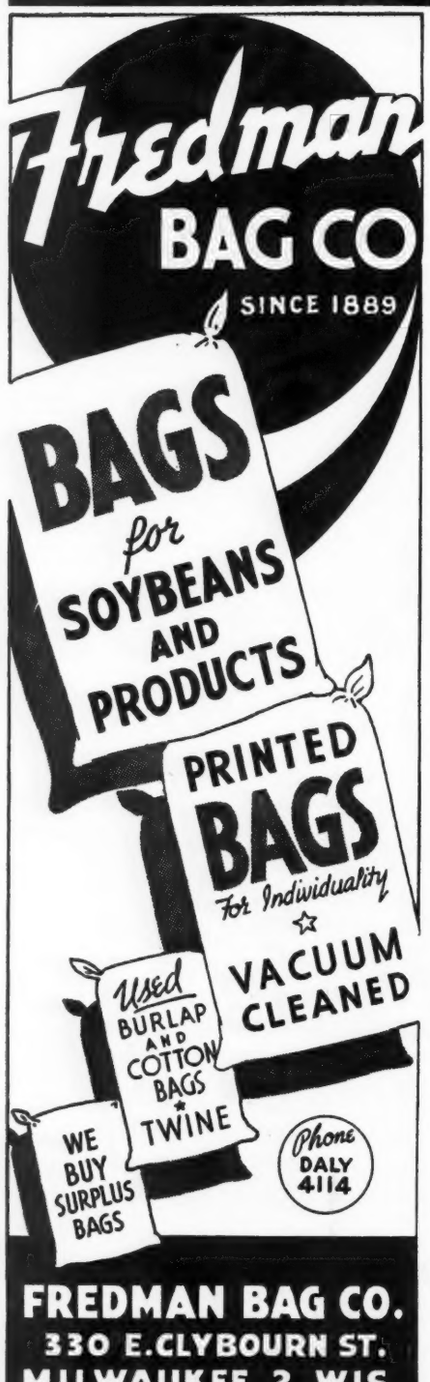
Research on the composition of soybeans, soybean oil, and soybean oil meal is fundamental and is necessary for other work or contemplated uses. We worked on the analytical determination of oil in soybeans and, during the war, when beans were bought and sold on an oil-content basis, our information and results were made available to the Commodity Credit Corporation as a basis from which was evolved, after many difficulties, a system of measuring oil content that satisfied both buyers and sellers.

At this Laboratory we have made contributions to many other problems. Among these are the determination of moisture, measurement of the amounts of the individual fatty acids in soybean oil, the isolation and composition of phosphatides from this oil, and the determination of refining loss. Much of this work was carried out in close collaboration with the American Oil Chemist's Society and with technical and research committees of the National Soybean Processors Association. Some of these problems are still being actively investigated; work along these and similar lines will always be needed as a basis and guide for other research on soybeans.

In studying soybean protein we have tried to find new uses and improve present ones, not only for isolated protein but also for soybean oil meal. By proper formulation we have used soybean oil meal as an extender for phenolic resins for plywood glues

[1]Presented by R. T. Milner at the Soybean Conference held at the Northern Regional Research Laboratory, Peoria, Illinois, on February 27-28, 1947.

[2]One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.



of both heat- and cold-setting types, and these have found some degree of commercial acceptance. We have also published extensively on the use of soybean meal in phenolic-type plastics, where lower-cost materials with improved color result from its use.

Although a large part of the present production of soybean protein is now used for paper coatings, this use would be much expanded if the color of the protein could be enhanced further. Improvement in the color of soybean protein, therefore, has been one of our major objectives. Better flavor of the protein is also desirable to encourage its use in such edible products as whips or meringues. Fortunately, we have found a change in the processing of soybeans that improves both color and flavor. I shall discuss it later.

PROTECTIVE COATINGS

In accordance with suggestions received from industry when the Soybean Laboratory was started, much of our work on soybean oil has been directed toward improving its drying properties for ultimate use in protective coatings. Along with this we have made various modifications and derivatives of linoleic acid, the major constituent of soybean oil. In the course of our work we have developed and reported on the following: a rubber substitute, "Norepol"; a polyamide useful for heat sealing and protective coatings, "Norelac"; and a catalytic method for isomerizing vegetable oils.

The problem of flavor stability in soybean oil is receiving more emphasis now than any of our other soybean projects at the Northern Regional Research Laboratory. Work on it was started when the U. S. Regional Soybean Industrial Products Laboratory was established at Urbana, but not until the last 2 years have we obtained really encouraging results.

Because of the lack of a satisfactory analytical procedure for evaluating flavor stability, we have devoted a great deal of time and effort to the development of a reliable taste panel which could determine the degree to which flavors have deteriorated in edible fats subjected to various treatments and conditions of storage. This flavor instability, or "going bad", is often referred to as reversion. Our panel is composed of selected individuals who have good taste sensitivities and who have been trained to judge the organoleptic properties of oils. Their results are analyzed statistically and have been found to be quite reliable and reproducible.

The most significant progress we have made toward solution of the so-called reversion problem resulted from an investigation of the methods used in Germany for processing soybeans and soybean oil. The Germans had at least one remedy for flavor instability in soybean oil. Their practices appear to have some merit, although not completely applicable to conditions in this country. Nevertheless, they have provided us with a new insight into the causes of flavor reversion and of some precautions that must be taken to avoid it.

German refiners use practically all their soybean oil without hydrogenating it, mixing it with other types of hard fats to produce blended products, chiefly margarine. The reason for this is that they discovered how to prevent the reversion of unhardened oil, or at least to inhibit its occurrence during the normal shelf life of the products, but their procedure is not applicable to hydrogenated soybean oil. The German method consists of the addition of a small amount of citric acid in the deodorization step, but it is highly effective only if the oil has been produced with a minimum of abuse and harsh treatment during production and in the earlier stages of refining.

CAUSE OF REVERSION

The elimination of these deleterious practices, in our opinion, affords one of the promising approaches to solution of the flavor problem in this country, for we have obtained considerable evidence that such abuses are occurring in many, perhaps most, of the processing mills and refineries in this country. We intend to pursue the study of these apparently harmful conditions, with a view toward suggesting corrections.

We are also attempting to discover the

exact cause of flavor reversion, hoping that success will enable us to devise means for preventing the chemical reactions responsible for undesirable flavors and odors. In our studies of reversion, we have received excellent cooperation from the processors and refiners and have maintained close contact with the Soybean Research Council.

Other research carried out at this Laboratory may be grouped under the broad heading of "processing." As I mentioned before, in attempting to improve the color of soybean protein for paper coatings and its flavor for edible purposes, we found it necessary to modify the method of removing the oil from the beans. If alcohol is used as solvent instead of the usual hydrocarbon solvent for oil extraction, the resulting oil meal may be used to produce a protein of much improved color and blander flavor. A favorable feature of this alcoholic extraction is the method of separating oil from the miscella, which avoids distillation of the solvent. We expect this new type of soybean processing will result in products of increased value and utility.

STUDY OF FRACTIONATION

The separation of soybean oil by purely physical means into two fractions, one more suitable for edible use and one more suitable for protective coatings, has been intensively studied. The principles of this continuous process of liquid-liquid extraction are well established but our engineering studies on this process are not yet complete.

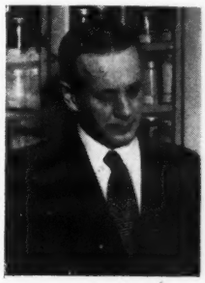
Largely as a part of these so-called processing studies, but based also on our other work on soybeans, we have accumulated a large amount of background information. The availability of this information, and of the research workers who have read and thought about their respective problems, has made it possible to furnish much help to inquirers such as farmers, processors, industrialists, agents of the government, experiment stations, and others. This information has been of immediate and tangible value, although in a sense it is a byproduct of our research program. Thus, specific formulas that call for soybean products have been furnished to makers of plywood, paint manufacturers, paper coaters, tanners, and many others who have requested assistance. Groups of farmers, county agents, and business men have received advice on the advisability of establishing processing plants or the operation of such plants.

This review of past and present research of the Northern Regional Research Laboratory indicates, I trust, a program with some very definite accomplishments to its credit. Its flexibility is not the least of its important features, yet this in no way hinders adherence to a definite objective for wider industrial application of soybean products. It is, we feel, a program that is and will continue to be exceptionally valuable to growers and to those in industry.

WORLDWIDE TREK TO LEARN ABOUT SOYS

The soybean, a crop adopted from the Orient, has made such a good name for itself in the United States that it is attracting worldwide attention.

Twenty foreign countries were represented by the 50 scientists, business men, and government officials who journeyed during the past 2 years to Plant Industry Station, Beltsville, Md., to confer with W. J. Morse, head of soybean investigations for the U. S. Department of Agriculture. Some of these visitors remained for a year and travelled all over the country to study production, processing, and other phases of the soybean industry.



W. J. MORSE

During the past 3 years, Mr. Morse has filled around 160 requests from other parts of the world for soybean breeding strains. Some of the requests have come from the Orient where seed is needed to replace stocks seriously depleted and in some cases lost during the war. Mr. Morse is filling the requests with samples of improved, high-yielding strains developed by agricultural scientists in this country. He is also able to supply seed from samples he collected in other countries in prewar years. For example, in filling a request from Korea recently, he included seed from the most promising strains of 2,500 original sample he collected there in 1929 and 1930 and has kept viable by frequent growing.

STOCK ORGANISMS FOR PREPARING SOY SAUCE

In China the making of soya sauce is mainly a household art, with grandmothers passing along to daughters and granddaughters the details of recipes and the strains of ferments used in the process.

In the United States, soya sauce—as is true of many other food products—is chiefly a factory product. Each manufacturer is concerned not only with producing a sauce of high quality, but also a standardized sauce in which each batch will have the flavor, color, and taste of every other batch. This calls for standardization of the raw materials and for use of standard strains of microorganisms in the fermentation of the sauce.

The U. S. Department of Agriculture has announced that strains of four organisms desirable in preparing soya sauce have been added to the culture collection of industrial ferments at the Northern Regional Research Laboratory at Peoria, Ill. These include two molds, a yeast, and a bacterium. They will be maintained as pure cultures and will be available to industrial users. This makes it possible for a fermenter to make a fresh start with new and pure cultures, if at any time his stock cultures become contaminated with "wild" molds or yeasts that injure the quality or uniformity of his product.

The fermentation division of the Bureau of Agricultural and Industrial Chemistry credits Pei Sung King of the National Bureau of Industrial Research, Chungking, China, with aid in selecting the strains of organisms and standardizing a process of fermentation that yields a high-quality sauce. Mr. King has been a guest worker at the Northern Laboratory.

The preparation of soya sauce calls for a brine fermentation of the beans for from 30 to 90 days. But the "starter" used in this process is a mixture of three previously prepared cultures: (1) of a mold that develops on cooked rice; (2) of a yeast working on soya broth; and (3) of a bacterial fermentation of soya broth.

NEW SOY FLOUR SALE

Sale of 37,600,000 pounds of soy flour to the U. S. Army Quartermaster Corps has been announced by A. E. Staley Manufacturing Co., Decatur, Ill.

Slightly more than 1 million bushels of soybeans will be used by Staley's in filling the order, which supplements an order of 17 million pounds of soy flour Staley's sold to the Army for shipment in March, April and May.

It will be necessary for Staley's soybean processing plant and flour mill there to continue to operate at capacity throughout the summer to fill the Army order and to meet trade commitments for flour, oil meal and oil to be shipped during the remainder of the crop year, which ends October 1.

—s b d—

WINS AD AWARD

This Chase Bag Co. advertisement, published early in 1946, was selected as the outstanding ad in its classification in the annual advertising awards of the Chicago Federated Advertising Club.

LATE PLANTING THREAT TO CROP

Soybean acreage may be above that of 1946 in most leading soybean states, *Soybean Digest* correspondents indicate in their June 1 reports.

A late planting season in practically all soybean producing states has greatly reduced small grain plantings and in some instances, corn. Much of this acreage may be replaced with soybeans. However, this depends on favorable June planting weather as only a small part of the soybean acreage was planted June 1.

Factors that tend to hold down acreage are the lower prevailing soybean market and a lack of seed in some sections.

Acreage increases over 1946 as forecast by correspondents: east central Arkansas 10-15%; Illinois 6%; southern Minnesota 10-20%; Mississippi 10%; Missouri 10-20%; eastern Nebraska 15%; Ohio 10-25%.

Walley Agricultural Service, Fort Wayne, Ind., in its farm and range situation report for May 25 stated: "Beans may reach the intended goals as a result of so many oats not going in. In most of the bean territory beans can stand late planting better than corn and a bumper crop of beans is still a possibility. Unless we have dry weather in the next 2 weeks in eastern Indiana, southern Michigan and Ohio, almost a total crop failure in that area will likely result."

June 1 reports from correspondents follow:

ARKANSAS

J. O. Dockins, extension soil specialist, University of Arkansas, Little Rock: Unusually heavy rains in some sections delayed planting of late cotton and some cotton already planted may be abandoned and planted to late feed crops or soybeans.

Jacob Hartz, Stuttgart, for east central: Less than 1 percent planted. With favorable weather, acreage 10-15% above 1946. High 1946 prices will cause increase. Too much rain past 3 weeks. Some growers trying out Lincolns for first time. Volstate and Roanoke showing small increase.

GEORGIA

Archie Langley, Office of Agricultural Statistician, Athens: 10% planted June 1. Acreage 90% of 1946. Lespedeza taking place of cowpeas and soybeans for hay. Late cold spring delayed farm operations. Weather favorable past 15 days.

ILLINOIS

H. I. Cohn, Wright, for west central: One-fifth of crop planted. Acreage about same as 1946. Lincoln variety coming along fast. Excellent early spring in some areas. Too wet for much field work in others. Last 2 weeks of May good growing weather but too wet for much planting.

J. E. Johnson, Champaign, for Champaign and adjoining counties: Planting date will average later than normal. 5% planted, but planting delayed by continued rain. Temperatures unseasonably cool. Acreage may show slight increase due to weather conditions preventing oat seeding. Farmers out of patience with recent bungling whereby growers didn't share in millions of dollars that fell to processing industry. Farmers are well aware of the serious soybean disease situation. Have seen a slow but steady yield decline in past 5 years. Of 85 farm operators one man completed his soybean planting last week. More interest in rowing beans this year.

Walter W. McLaughlin, McLaughlin Agricultural Service, Inc., Decatur, for Decatur: None planted June 1. Acreage 90% of 1946. Some oats land being planted to beans. Weather conditions wet and cold. Lincoln 100% here this year.

Russell S. Davis, Clayton, for west central: 1% of crop planted. Weather has developed a slow leak. Much plowing yet to do. Acreage will be larger than 1946 if time permits getting it planted. Not more than half the intended oats acreage seeded. First intention was to plant corn on a lot of oat acreage, but it has stayed wet too long to get corn planted. Inquiry for seed beans picking up again. Perhaps some further shift to Lincoln.

A. J. Surratt, Illinois Crop Reporting Service, Springfield: Only 10-15% total soybean acreage planted by May 30 against 32% last year and 10-year average of 37%, due to frequent rains slowing planting part or most of time this spring. Most backward areas mainly southeastern quarter and upper northeast. 75-85% of total acreage will be planted in June compared with 68% last year and 10-year average of 63%. This work will move fast whenever weather permits after corn in. Floods have been much less a problem than rains stringing along with discouraging frequency. Seed supplies tight to ample.

Proportion of acreage sown to Lincoln will be upped from 50% last year to fully two-thirds this year. Total acreage about 6% above 1946 and 200,000 acres more than USDA crop goals.

INDIANA

J. B. Edmondson, Clayton, for south central: Planting 2 weeks late. 10% planted. Only about 30% of corn in. Most corn will be planted before beans. Acreage about same as 1946 or less. Agitation about erosion reacting against soy acreage. As rains continue bean acreage will increase. Practically all planting here is Lincoln.

Peter J. Lux, acting chairman Indiana AAA, Indianapolis: Planting held up by wet weather. About 1% planted. Present indicated acreage as much or more than 1946. Tendency for acreage to increase due to late corn planting and decrease due to lack of availability of good seed stock. Producers now buying anything in way of seed that is available regardless of variety. Some areas report 50% of plowing for corn and soybeans yet to be taken care of.

Ersel Walley, Walley Agricultural Service, Fort Wayne, Ind., for northeast Indiana and northwest Ohio: Planting 7-10 days late. Not over 10% planted. Due to failure to sow oats acreage might exceed 1946. Have had 42 days of rain during April and May over most of territory. Not heavy but enough to prevent work in fields. Not over 60% of oats were put out. Two-thirds of acreage intended for oats and not sown will go to beans if it ever gets dry enough. Cost of seed hurts acreage some but farmers turning to row seeding as answer. Mostly Lincolns planted. Some Earlyanas for early seeding.

K. E. Beeson, Indiana Corn Growers Association, Lafayette: It is so wet in Indiana that less than 50% of corn crop planted June 5. Farmers will plant corn first and if conditions permit will plant soys afterward. In many sections much plowing remains to be done. It is our guess 5% of intended soybean acreage is planted. Lincoln will predominate as last year and possibly be a bit more widely used. Supplies of Richland and Earlyana seed so limited that they cannot be widely used for delayed planting.

IOWA

Martin G. Weiss, farm crops department, Iowa State College, Ames, for north central and central: Planting 7-10 days late. 40% planted. Acreage 15-20% higher than 1946, slightly less than USDA goals. Weather very wet and cool. Germination to date seems quite good, however. Some oats didn't get planted and ground will be planted to beans. If freeze of May 28-29 killed corn that is up, some of this acreage may go into beans. Do not think beans which were up entirely killed by freeze.

H. E. Hazen, State AAA, Des Moines: Planting normal in north central, 1-4 weeks late as we go south. 35% of crop planted. Acreage 70% of 1946. Weather extremely bad in south to fair in north. High corn prices and scarcity of seed cuts acreage: wet weather and late season increased acreage. More Lincolns planted than last year.

Howard L. Roach, Plainfield, for northeast: Planting 10 days late. 15% planted. Acreage 15% greater than 1946. Soybean price decline and high corn price has discouraged some soybean acreage.

O. N. LaFollette, State Department of Agriculture, Des Moines: Planting in northwest well along. Rest of state lagging. About 45% of state acreage planted. Total acreage governed by weather but equal or greater than 1946.

Fred Hawthorn, Castana, for western: 80% planted. Acreage less than 1946. Farmers think corn pays better than beans. Some land that did not go to oats will go to beans. Snow and heavy freeze May 29 did not affect beans so much as corn.

KANSAS

E. A. Cleavinger, extension division Kansas State College, Manhattan, for eastern: Planting late. Not over 10% planted. Weather conditions good though spring late. Acreage 25% less than 1946. Large acreage of wheat and oats has left less land for soybeans.

KENTUCKY

Ralph Kenney, agronomy field agent, Lexington, for Calhoun-Owensboro-Henderson: Planting 10 days late. Weather wet through March, April and May. Already 2½ inches in 2 days of June. 20% planted. Will plant 20-25% more soybean acreage than in 1946 if weather turns very favorable. More Lincoln, less Dunfield this year. Ogden is increasing but late season cuts acreage this year.

MARYLAND

E. C. Jenkins, administrative assistant, Maryland State PMA; for eastern shore: Planting date normal. 30% planted. Estimated 10% acreage increase over 1946. Good market has encouraged increased soybean acreage and 5% shift from corn to soybeans due to wet weather.

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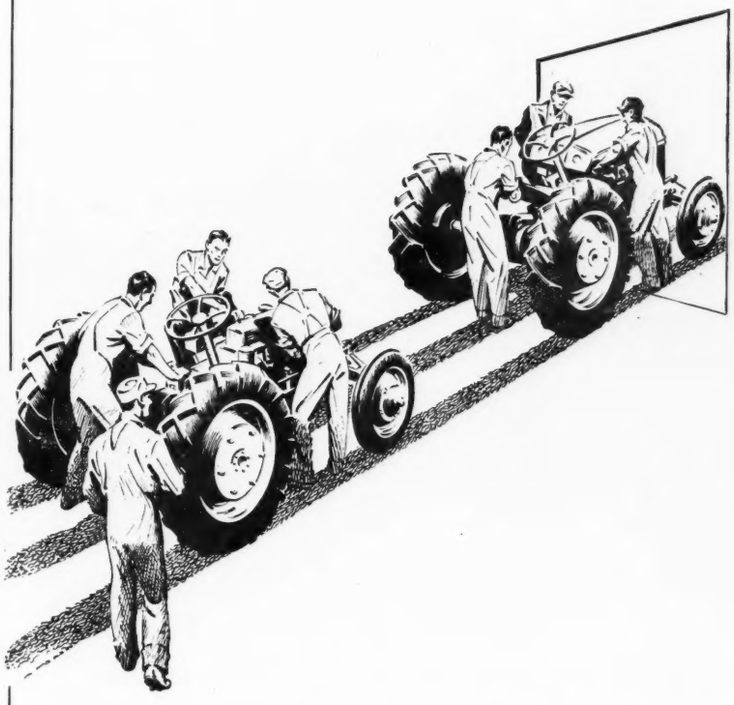

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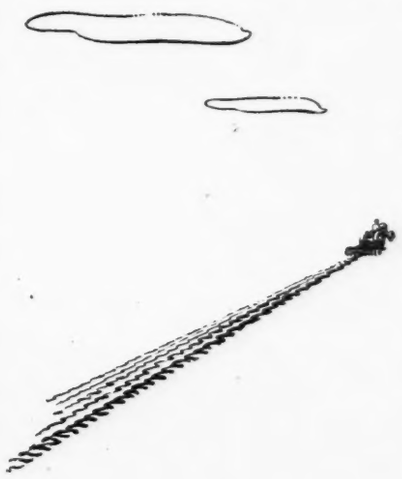

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F O R D M O T O R C O M P A N Y

MICHIGAN

Farm Crops Department, Michigan State College, East Lansing: Season very backward on account of rain. During May rain fell at least 22 days. In Lenawee County, our greatest producing county, on June 2 there were no known fields planted. Trend will be toward early varieties on account of weather.

MINNESOTA

John W. Evans, Montevideo, for southwest central: Weather cold, wet. Many farms just finishing corn planting and first corn plantings show emergence. 10% soybeans planted. Acreage perhaps ahead of 1946. Delayed wet spring created acreages for soybeans from land not able to be planted to small grain. Increase in Ottawa Mandarin plantings.

R. N. Bieter, Farmer Seed & Nursery Co., Faribault, Minn., for southeast: Planting week to 10 days late. Very cold, wet spring. Temperatures average around 40 degrees May 28. Probably 50-75% crop planted. Acreage 15-20% above 1946. A spring at least 3 weeks later than normal has caused a shift from grain to soybeans and corn. Recent drop in market has not appeared to have adverse effect on acreage. Growers want earlier maturing varieties such as Ottawa Mandarin and Wisconsin 606 rather than Earlyana and Richland.

W. G. Green, Lakefield, for southwest: Planting date a little earlier than normal. 80% planted. Acreage 10% less than 1946. More acres used for flax and corn. Weather ideal.

MISSISSIPPI

L. S. Stoner, Holly Bluff, for Yazoo County, Miss.: Planting date about 2 weeks late. Season very backward due to excessive rain and cold. 95% planted. 10% more acreage planted than in 1946.

MISSOURI

E. M. Poirot, Golden City for southwest: No beans planted. Acreage will be greater because corn acreage is much reduced due to wet weather and cold.

J. Ross Fleetwood, extension specialist field crops, Columbia: Weather conditions very good except rather cool. Planting week later than normal. 50% planted. Acreage 10-20% above 1946, 15% above USDA goals. Reduced oat acreage caused the increased intentions.

NEBRASKA

A. E. Anderson, agricultural statistician, Lincoln: Corn planting 71% completed last Saturday. Except for present rain, job would be practically finished by end of week. That would permit soybean planting little if any behind schedule. Earlier, looked for considerable increase in acreage because of delayed seeding of oats. Later information indicated difficulty in getting soybean seed. Present outlook is for a much larger acreage of soybeans than earlier intentions. However, we do not have definite information.

Fremont Cake & Meal Co., Fremont, for eastern: Weather cold and wet. Planting about 2 weeks late. 20% planted. Cold wet spring will increase bean acreage about 15% above 1946. Due to late spring will be less Lincolns and more Richlands planted.

NEW YORK

R. L. Gillett, agricultural statistician,

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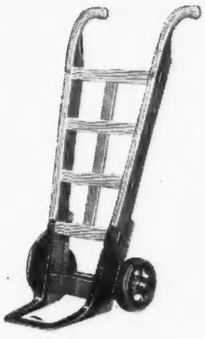

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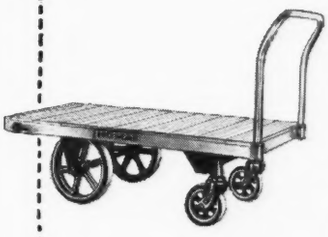

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Albany, N. Y.: Continued wet weather has seriously hampered field work of all kinds. Progress through May very slow.

NORTH CAROLINA

Russell P. Handy, agricultural statistician, Raleigh, for east: 90% crop planted. Acreage about 100% of last year. Assuming same relationship as in 1946 between total soybeans and soybeans for beans, will be only about 85% of USDA goals planted. Very dry during early May but recent rains have provided near adequate moisture for the present. Soybeans here have to compete heavily with other cash crops such as tobacco, cotton and peanuts.

NORTH DAKOTA

Harry D. Lohse, agricultural agent, Greater North Dakota Association, Fargo: We have had a very cool late spring. Very little of soybean crop planted. From best information I can obtain from 8,000 to 10,000 acres will be planted in North Dakota (6,000 acres in 1946) if weather conditions continue favorable from now on. However there will be some acreage devoted to flax which would normally go to soybeans because of the much better price relationship for this crop.

OHIO

W. G. Weigle, Marsh Foundation Farms, Van Wert, for northwest: Planting will be 4-5 weeks late. Practically none planted. 2 to 3 inches of rain June 1 will delay planting until after June 10. All beans will be planted very late in this section, too late for varieties of Lincoln maturity, but supply of earlier maturing varieties is exhausted. Farmers have seed of late varieties on hand and will plant regardless of date. Acreage about same as 1946, but below USDA goals. High market prices took out some beans that would have stayed on farms for seed.

D. F. Beard, extension agronomist, Ohio State University, Columbus: Wet, cold backward spring. 10% or less planted. Acreage may be more than 1946 if rains further delay corn planting. Oat plantings are way below normal. Corn planting is already late. More Lincoln and Earlyana, about same or less Richland, and less non-recommended varieties to be planted.

G. G. McIlroy, Irwin, for central: Planting 2 weeks late at best. Scarcely any beans planted. Less than 5% of corn planted June 1. 5.93 inches rainfall in April and 6.04 inches in May. Probable acreage 110-125% of 1946, but unless farmers are permitted to finish their plantings within next 2 weeks there is little chance of average crops of soybeans and corn in Ohio.

SOUTH DAKOTA

H. G. Miller & Son, Garden City, for Clark County: Weather cold and wet. Late with field operations. Very little crop planted. 10-15% increase in acreage over 1946 due to late spring for small grains. We are planting 152 acres of Wisconsin 507 and Ottawa Mandarin.

WEST VIRGINIA

R. J. Friant, extension agronomist, Morgantown: Cold, wet soil has delayed planting, which is 2-3 weeks late. Probably not over 50% planted.

WISCONSIN

John P. Dries, Saukville, for southeast: Weather way below normal. Seems an earthquake couldn't change it. Planting 3-4 weeks late. No beans planted. Acreage 50% below 1946. 50% corn planted. Trend to early varieties.

Geo. M. Briggs, farm crops department, University of Wisconsin, Madison: 30% crop planted. Weather terrible. In some areas only 50% of corn planted, even in better corn sections of state. Some growers had planned on more Lincolns but lateness of season may alter plans.

—s b d—

CARRY CANCER STUDY TO SOYBEAN ROOTS

Chemical and biological studies of plant tumors will be carried out at Iowa State College under a federal grant of $7,500 effective July 1 from the Health Service and National Cancer Institute, Dr. Charles E. Friley, president, has announced.

The work will be directed by Dr. S. W. Fox, research associate professor in the chemistry section of the Iowa Agricultural Experiment Station.

Through the study of plant tumors such as soybean root nodules and corn smut, which have much in common with cancers in animals, the scientists hope to work out basic principles which apply to both. The plant tumors, the scientists explain, have many experimental advantages, including that of less time required for study.

Dr. Fox has been conducting study of chemical problems of protein synthesis and general problems of cell nutrition.

MILNER HEADS OIL CHEMISTS

Dr. Reid T. Milner, head of the analytical and physical chemistry division of the Northern Regional Research laboratory, Peoria, Ill., since 1941, was elected president of the American Oil Chemists' Society at its 38th annual meeting in New Orleans May 22. He was first vice president and membership chairman last year and has succeeded in office S. O. Sorenson of the Archer-Daniels-Midland Co., Minneapolis.

R. T. MILNER

Other officers for 1947-48 are as follows: C. P. Long, chemist in the analytical methods section, standards department, chemical division, Procter and Gamble, Cincinnati, first vice president; E. M. James, general supervisor of research, Lever Brothers Co., Cambridge, Mass., second vice president; V. S. Mehlenbacher, assistant chief chemist, Swift and Co., Chicago, third vice president; L. B. Parsons, chief chemist, Lever Brothers Co., Cambridge, Mass., fourth vice president in charge of the soap section of the Society; H. L. Roschen, research chemist, Swift and Co., Chicago, secretary; and J. J. Vollertsen, retired chief of chemical research development, Armour and Co., Chicago, treasurer.

Mrs. Lucy R. Hawkins was appointed executive secretary of the national headquarters in Chicago.

Registration for the New Orleans meeting ran over 300, according to H. P. Newton, general chairman. Committee reports and 18 technical papers were presented.

Of interest to the soybean industry were the following papers, which will be published in the *Journal of the A. O. C. S.*:

"The Effects of Deodorization on the Stability of Vegetable Oils" by A. R. Baldwin, Corn Products Refining Co., Argo, Ill., in which it was shown that stabilities of the oils increase rapidly during the initial part of the deodorization.

"Soap Content of Some Commercially Refined Oils: Effect of Soap on the Bleachability of the Oils" by Wales Newby, Cotton Products Co., Inc., Opelousas, La., who indicated that soybean oil may run from 0.183 percent to 0.207 percent soap at various stages of processing.

"A Study of the Caustic Refining of Vegetable Oils" by R. H. Fash, Fort Worth laboratories, Fort Worth, Texas, is a description of mist-mixing versus liquid-mixing.

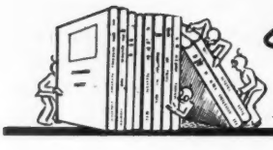
"The Accurate Determination of Tocopherol Content during the Commercial Processing of Soybean Oil" by Noel Kuhrt, H. W. Rawlings, and J. G. Baxter, Distillation Products, Inc., Rochester, N. Y., presenting a discussion of the methods for assaying low-potency tocopherol preparations.

"Determination of Nitrogen in Vegetable Oils" by T. A. McGuire, F. R. Earle, and H. J. Dutton, Northern Regional Research Laboratory, Peoria, Ill., describing a method for the determination of nitrogen in vegetable oils.

The 39th annual meeting of the American Oil Chemists' Society will be held in New Orleans also, on May 2-6, 1948, with T. H. Hopper as chairman.

—s b d—

The most important thing in controlling soybean diseases is a good rotation. Don't follow beans with beans, says the University of Illinois.



Publications

Foods

NUTRITIONAL IMPROVEMENT OF CEREAL FLOURS AND CEREAL GRAINS, by Barnett Sure, head Department of Agricultural Chemistry, University of Arkansas, in *Cereal Chemistry.*

Many of the world's people still live largely on cereal grains. Even in the U. S. we depend on grains for 36 percent of our protein.

But plant proteins vary greatly in the proportion of the various amino acids. There is acute need for finding ways to improve the nutritional values of cereal grains and flours.

Dr. Sure undertook this study to learn the effect of adding small amounts (1 to 5 percent) of cultured food yeasts, brewers yeasts and soy flour to refined wheat flour, white corn meal and polished rice in the diets of albino rats.

The remarkable results from the use of yeasts as protein supplements to the milled grains stimulated a similar study with soy flour. The results were no less remarkable. They are summarized briefly.

Substitution of 1, 3 and 5 percent of enriched wheat flour with equal amounts of soy flour increased the total protein in the rations by 4.2, 12.5 and 20.8 percent. It resulted in increased gains in body weight of the rats of 55.2, 108.3 and 192.4 percent; and increased biological values of 23.9, 45.5 and 60.2 percent respectively.

The same additions of soy flour improved the proteins in milled white corn meal even more. The replacement of 1, 3 and 5 percent of corn meal by soy flour resulted in 86.0, 172.8 and 270.7 percent increased growth; and in 46.8, 70.9 and 95.0 percent increased protein utilization respectively.

Soy flour was more effective than the cultured food yeast in improving rice proteins. Substitution of 1, 3, and 5 percent of polished rice by the soy flour resulted in 20.6, 75.0 and 123.5 percent increases in body weight of the rats.

White bread is generally baked with 5 to 6 percent milk solids included in the mix. For this reason it was of interest to know if the proteins in soy flour would further enrich the proteins in patent wheat flour, in the presence of these milk solids.

Results of the study indicated that great nutritional benefits may be derived from including 5 percent soy flour in the flour mix with the 5 percent milk solids. It was found that the addition of 5.0, 7.5 and 10.0 percent soy flour, replacing equal proportions of the wheat flour, even in the presence of 5 percent skim milk powder, resulted in increased body weights of 74.3, 86.5 and 106.8 percent respectively.

Dr. Sure suggests that perhaps the best combination for a low-cost, high-protein and high-vitamin-B-complex diet might be obtained by blending patent wheat flour with a 5-to-10 percent combination of soy flour and dried cultured food yeasts or debittered brewers' yeasts. The yeasts would furnish an abundance of the B vitamins and essential amino acids as supplements to the proteins in wheat flour. Soy flour is cheaper than the yeasts and would decrease the cost of enrichment. At the same time it would maintain the biological potency of the diet.

THIAMIN AND RIBOFLAVIN RETENTION IN SOY-EXTENDED PORK LOAVES OF TWO SIZES. By Norma Hotaling and Faith Fenton in *Journal of Home Economics.*

Studies were made to determine the effect of baking and of storage on the thiamine and riboflavin content of soy-extended loaves baked in 2-lb. and ⅓-lb. loaves. All lots contained 15 percent soy grits.

The thiamine retention was about the same, 80-88 percent in both sized loaves. No appreciable amount of riboflavin was lost from either size loaf during baking.

No loss of thiamine or riboflavin occurred during storage of the baked loaves in the refrigerator at 40° to 50°F. for 7 to 11 days.

A 100-g. serving of the meat loaf contained from .80 to .89 mg of thiamine and from .74 to .90 mg of riboflavin, that is, over one-half of the recommended daily allowance of thiamine and almost one-half of the riboflavin.

Feeding

THE QUANTITATIVE UTILIZATION OF UREA AND SOYBEAN OIL MEAL NITROGEN BY STEERS. By Lorin E. Harris in *Hawaiian Academy of Science Proceedings.*

The Territory of Hawaii imports most of its protein concentrates. Urea contains 46.6 percent nitrogen and is a possible substitute for vegetable proteins.

Experiments were undertaken to determine whether the rate of conversion of urea nitrogen to protein was sufficient to cover a part of the protein requirements of growing steers and to measure the efficiency by determining the biological value of urea in comparison with that of soybean oil meal. The experiments consisted of a series of nitrogen metabolism studies on four Holstein steers, using rations prepared by substituting urea and soybean oil meal in amounts of 11 to 12 percent protein equivalent to a basal ration containing 1.44 percent protein.

Conclusions drawn from the studies:

Apparent digestion coefficient of urea nitrogen was 74 and that of soybean oil meal 78. When corrected for the metabolic nitrogen in the feces the values were 93 and 92, respectively.

Biological value of urea nitrogen is 24 and that of soybean oil meal nitrogen 54 when fed at levels as above mentioned. When fed at a lower level of intake the biological level of urea would probably be much higher.

In case of a blockade of the islands

during war, urea would be very valuable, as it is high in nitrogen, is cheap per pound of nitrogen, and could be shipped and stored in less space than other concentrates.

THE INFLUENCE OF AUTOCLAVING SOYBEAN OIL MEAL ON THE AVAILABILITY OF CYSTINE AND METHIONINE FOR THE CHICK. By Robert John Evans and James McGinnis, Washington Agricultural Experiment Station, in *Journal of Nutrition.*

Investigators have found considerable variability in the nutritive value of the proteins of different commercial soybean oil meals. Indications are that this is caused by differences in the extent of denaturation of the proteins by heat treatment.

The purpose of the investigation was to determine the influence of autoclaving soybean oil meal at different temperatures on chick growth, and on the availability of the cystine and methionine of soybean oil meal for chicks.

The nutritive value of the proteins of raw soybean oil meal, as determined by total gain in weight and gain per gram of protein consumed by chicks, was increased by autoclaving the meal at 100°C., 110°C., or 120°C. for 30 minutes. Nutritive values were lower when the oil meal was autoclaved at 130°C. than when autoclaved at the lower temperatures.

Availability of the methionine, cystine and organic sulfur was increased by autoclaving. But availability was not as great when autoclaving was done at temperatures above 120°C., as it was at temperatures 100°C. to 120°C.

VEGETABLE PROTEIN CONCENTRATES IN RATIONS FOR EGG PRODUCTION. *Bulletin 491,* Missouri Agricultural Experiment Station.

There has been an acute shortage of animal protein concentrates. H. L. Kempster considered it advisable to determine the extent to which vegetable protein concentrates could be used in mashes for laying hens.

Laying mashes containing various proportions of meat scrap and soybean oil meal were fed to laying hens. The all meat-scrap mash contained 20 percent meat scrap. In the remaining pens soybean oil meal was substituted for the meat scrap to the extent of 25-50-75 and 100 percent. In one pen lespedeza seed replaced one-half the meat scrap.

There appeared to be no appreciable difference in egg production between the various groups. Production per bird from September 12 to March 31 ranged from 58 to 68 eggs.

There also appeared to be no significant differences in the hatchability of the eggs produced by the various groups. It would therefore appear that vegetable protein concentrates such as soybean oil meal could be extensively used to provide adequate protein in rations for laying hens.

CONTROL OF RANCIDITY IN SOYBEAN-FED PORK, By D. E. Brady, F. H. Smith and L. N. Tucker, in *Journal of Animal Science.*

That whole soybeans and other feeds of high oil content will produce soft pork when fed to hogs is well known. The large soybean acreage and the high quality of soy protein insures that rather large quantities of soybeans will be fed to hogs. Frequently hogs run on fields following the combine and pick up the beans missed in harvest. The low cost of gains produced by this method may justify the production of soft or oily pork.

The authors felt it desirable to have information available on stabilizing cured meats produced from such carcasses. The investigations reported are a part of extensive research undertaken to find improved methods for controlling the development of rancidity in cured pork. Such methods would increase the value of the cured cuts by preventing waste and improving palatability.

By restricting the amount of soybeans fed as well as restricting the periods in which they were fed it was possible to produce pork carcasses of varying firmness of fat.

Penicillin

PENICILLIN BLOOD LEVELS AFTER A SINGLE INTRAMUSCULAR INJECTION OF PENICILLIN IN VARIOUS OILS. *Science,* Nov. 1, 1946.

Studies were made to determine the most satisfactory liquid for preparing penicillin suspensions for intramuscular injection. Peanut oil, cottonseed oil, soybean oil, hydrogenated soybean oil, hydrogenated peanut oil and peanut oil-beeswax mixtures were used in the experiments.

GRITS and FLAKES... FROM THE WORLD OF SOY

Richard Alcott, vice president and general manager, Riechman-Crosby Co., Memphis, was elected vice president of the Southern Supply and Machinery Distributors Association at the convention in Atlantic City, May 12-14. He spoke on "Importance of Local Group Meetings."

* * * *

Dr. A. Ernest MacGee, Skelly Oil Co., Kansas City, Mo., gave an address on "Vegetable Oil Extraction Solvents, The History and General Chemical Compositions" before the annual convention of the Tri-States Oil Mill Superintendents Association May 15-16 in Biloxi, Miss.

* * * *

Harry A. Bullis, president of General Mills, Inc., is one of a group of Minneapolis business men who will fly to Sweden in June to present a formal invitation to the Olympic Committee to hold the Olympic games in Minneapolis in 1952.

* * * *

May issue of CROWN, *publication of the bottle closures field, carried a well illustrated feature article on soybeans.*

* * * *

Budd E. Simonton has been appointed manager of the Oswego, N. Y., multiwall paper bag plant of the St. Regis Paper Co. He succeeds Theron Contryman, who held the position for 18 years.

* * * *

Dixie Machinery Mfg. Co., St. Louis, announce a new, informative six-page hammermill bulletin titled, *The Greatest Feed Grinding Advance in Years.* The bulletin will be supplied free of charge for all mills requesting a copy. The firm is maker of the patented Dixie double-drive hammermill.

* * * *

Uses of soybeans and their products have been among the demonstrations of the nutrition-health classes for adults sponsored by the women's clubs of Lawton, Okla.

* * * *

The 236-foot-high tower of the General Mills, Inc., soybean storage elevators at Belmond, Iowa, which have become a north Iowa landmark, was subject of a recent story in the DES MOINES TRIBUNE.

* * * *

G. S. Ziegler & Co., New York, announce that the new research and customer service laboratory at its New Market, N. J. plant is nearing completion and that Carl E. Hillers, chemical consultant, has been engaged to supervise this division.

* * * *

Melvin J. Killian has been appointed technical director of the Kalamazoo, Mich., paper mill of the St. Regis Paper Co. He was associated with the Combined Locks Paper Co. for 10 years.

* * * *

Plans for immediate construction of a $200,000 solvent plant for extracting soybean and other vegetable oils were announced recently by Harold A. Miller, president of the Louisville Soy Products Corp., Louisville, Ky. The company has leased the Thompson Grain Elevator Co. property at Louisville.

* * * *

The Diamond Rassman precision beet seeder can now be converted to a soybean plant-

C. T. PRINDEVILLE

DIRECTS SWIFT MILLS

C. T. Prindeville, vice president in charge of Swift & Co.'s plant food operations, will take on the added duties of directing operations of the firm's oil mill and livestock feed business, it has been announced by John Holmes, president.

Vice President P. M. Jarvis, who has had charge of the oil mill and feed operations, will now devote full time to his executive duties in assisting the president.

Prindeville is well known in the cottonseed and soybean processing industries. He was in charge of Swift's cottonseed and soybean mills and peanut shelling plants before the war. Prindeville spent nearly 2 years in wartime government service. He served with the general staff of the Army, the War Production Board

Staley's

SOYBEAN OIL MEAL

(41% OR 44%)

A good business builder

Formula feed manufacturers, and dealers are building their businesses around STALEY'S Soybean Oil Meal (41% or 44%) knowing they can depend upon its uniform high-quality. Every step of the manufacture is carefully checked and re-checked. Cooking temperatures are scientifically maintained, oil is efficiently removed and moisture content is kept under exacting control.

Through this careful processing, STALEY produces a quality Soybean Oil Meal.

- ☆ Rich in essential protein requirements.
- ☆ Highly nutritious and digestible — very palatable to livestock and poultry.
- ☆ Rounds out the formula for a perfect balanced ration.
- ☆ Stimulates appetite — puts an excellent finish on animals.
- ☆ Economical — always of uniform high-quality.

Old friends and new keep coming back for more STALEY'S Soybean Oil Meal (41% or 44%).

The Staley Customer *NEVER GUESSES*, He Knows

A. E. STALEY MFG. CO.

Feed Division

Decatur, Illinois **Painesville, Ohio**

er, Albert N. Wold, agricultural engineer for the Diamond Iron Works Co., Inc., Minneapolis, has announced. The mechanism of the conversion unit is very simple and can be readily attached to the chassis of the drill.

* * * *

W. E. Glennon, Elmhurst, Ill., has been elected secretary of the American Feed Manufacturers Association at a recent meeting of the board. Other officers, including Lloyd S. Riford, Cayuga, N. Y., chairman; and Walter C. Berger, Des Moines, Iowa, president, were reelected.

* * * *

ASA president Walter W. McLaughlin, Decatur, Ill., is chairman of the agricultural committee of the University of Illinois board of trustees.

* * * *

Oils from soybean, cottonseed, corn, and lard provide nutrients which aid in keeping a normal, healthy skin, Dr. Paul Gyorgy of Philadelphia reported before a meeting of scientists.

* * * *

Dr. W. L. Burlison, head of the department of agronomy, University of Illinois, presided recently at impressive ceremonies to name Davenport, Bevier and Mumford halls at the University.

* * * *

The West Tennessee Soya Mill, Tiptonville, Tenn., have installed four expellers for soybeans, and are also crushing soybeans at the Lake County Oil Mill, Tiptonville, Tenn. according to P. T. Pinckney, Sr., manager of both plants. The West Tennessee mill was destroyed in a fire last fall, and will be replaced with a solvent extraction plant under construction. Due to the large amount of soybeans on hand, the expellers were installed to complete their crush.

* * * *

The Dave Fischbein Co., Minneapolis, Minn., has appointed Bemis Bro. Bag Co. exclusive distributor of its new hand-electric filled-bag closer. The machine weighs less than 11 pounds including a full cone of thread, and is the only closer of its kind on the market.

* * * *

The Harrow Taylor Butter Co., manufacturers of margarine, 612-14 Broadway, Kansas City, Mo., became Kent Products Inc., effective June 1, the firm announces. Personnel and products remain the same.

* * * *

Dr. Alexander Schwarcman, technical director of Spencer Kellogg & Sons, Inc., Buffalo, N. Y., was a recent speaker before the Los Angeles Paint and Varnish Production Club.

* * * *

A new Chinese dinner combination was recently announced by La Choy Food Products Division, Archbold, Ohio. The new streamlined carton contains one bottle of soy sauce and one can each of meatless chop suey and chow mein noodles. The item is being distributed by leading wholesalers from coast to coast.

* * * *

Soybean Crop Improvement Council of the National Soybean Processors Association has issued a booklet containing the latest information on soybean cultural practices with the aid of agronomy staffs of Midwest universities. Copies may be obtained from Soybean Crop Improvement Council, 3818 Board of Trade Bldg., Chicago 4, Ill.

* * * *

Wuest's Five-Grain Bread contains 25 percent soy flour and is merchandized in a 10½-ounce can. The product is made by Wuest Laboratories, 225 10th Ave., New York City 11.

and later was made chief of the fats and oils branch of the War Food Administration. He also served as American representative on the fats and oils committee of the Combined (U. S., British, Canadian) Food Board.

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DANNEN AWARD DINNER

The first annual service award dinner for the office employees of Dannen Mills, Inc., and their families was held the evening of May 7 in St. Joseph, Mo.

E. A. Gumbert, purchasing agent, was awarded a solid gold pin for his 20 years of service with the company. Miss Edna Dawson, secretary and assistant treasurer, was presented with the 15-year service award pin.

Those receiving 10-year service award pins: Arthur Frank, E. R. Rutledge, George C. McClain, George Lippold, Wm. C. Crabtree, Harold Underwood, A. J. Monach, W. J. Sprengel, C. F. Cremer and Joe Joffe.

Five-year service award pins were given to: Charles Mannschreck, Steve Salanski, C. W. Glassel, Jean Conner, Olin Herriott, Bette Scott and Arlene Ruby.

President H. L. Dannen made the presentation of service pins, and Vice President Dwight L. Dannen presided.

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RAY WM. KANITZ DEAD

Ray Wm. Kanitz, 55, for years the sales and advertising manager of the Nitragin Co., producers of inoculation, passed away at his home in Milwaukee, May 4. He had been suffering with a heart condition.

Kanitz had many friends in the seed trade. He took his degree in agriculture and animal husbandry at the University of Wisconsin and was for a time associated with various firms in the seed and fertilizer industry.

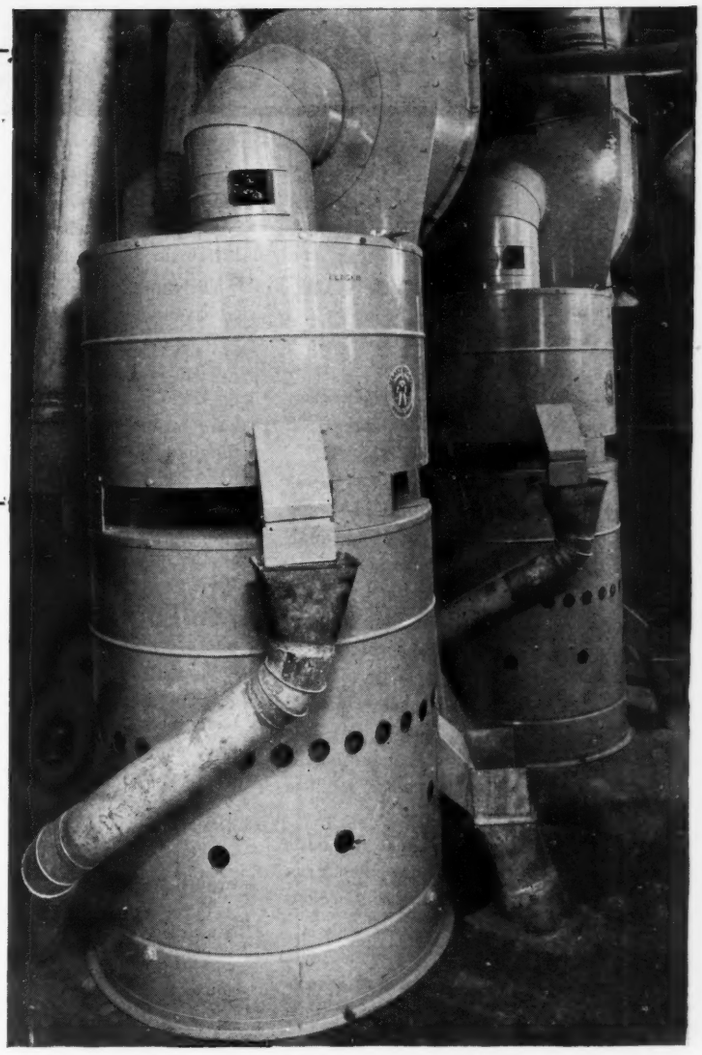
A regular visitor at seed and canners conventions, Kanitz will be missed by his many friends who always stopped at the Nitragin Co.'s convention displays so that they might pick up a little of his contageous good humor. He was highly regarded as a seed and inoculation authority.

Haaky

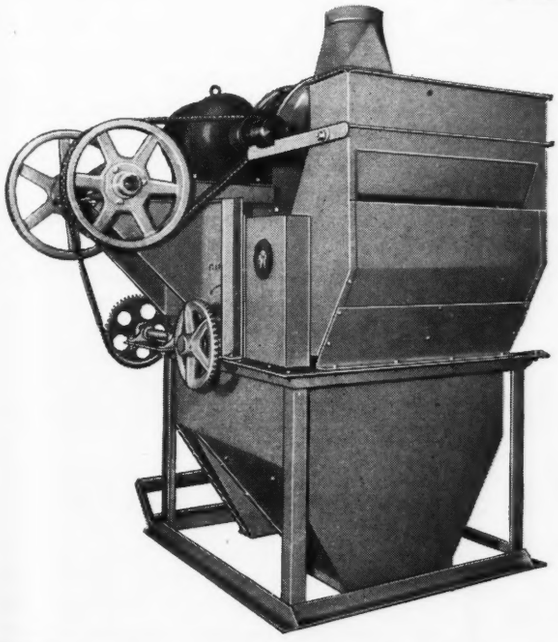
"CENTRAL" ASPIRATION

--the Master Key to Efficient, Economical HULL REMOVAL

The patented HAAKY method of aspiration combines a Floating Unit Feed Spread Control with a centrally located air suction tube. It provides a uniform and automatically spread circle of cracked beans passing to aspiration, for removal of hulls, chaff and other light materials. The spread is **automatically** adjusted by the **volume** of beans entering the machine. Less operating attention is required. Automatic release.



HAAKY Aspirator



HAAKY Overtop SCALPER

Improved Design and Construction for More Efficient, Economical Operation.

Equipped with FAN and ASPIRATING TOP. Provides CLOSE SCALPING and ASPIRATION at HIGH CAPACITIES — in removing coarse materials, light weed seeds and chaff before beans go to storage or processing. Employs the HAAKY slowly rotating perforated scalping roll.

LOW OPERATING COST. Entirely rotary motion. Requires less power. Sturdy, durable all-steel construction — low maintenance costs. Working parts enclosed for cleanliness.

Up to 2000 bu. per hour capacity — built in several sizes. Available for line shaft or top mounted electric motor drive.

Write for full information on HAAKY equipment.

HAAKY MANUFACTURING CO.

517 Vandalia St., St. Paul 4, Minn.

WASHINGTON Digest

The Price Outlook

Department of Agriculture price experts think that lard prices have become adjusted from the March peak, and that soybean prices are now pretty well shaken down until late fall.

Then they expect soybeans to take another price drop.

Soybean oil prices have declined about 35 percent from the March peak of 35 cents a pound at Chicago.

The average farm price of soybeans dropped from $3.67 a bushel in mid-March, the high month, to $3.01 a bushel in mid-May, a decline of 15.3 percent.

It would take a price drop of 44½ percent from the March average farm price to bring soybeans down to the level of support prices.

While this steep a decline isn't expected generally, some price officials think the $2.04 support price may be more important to producers than it seemed to be a month or two ago.

Price officials here think that the basic farm price weakening has now about run its course until business activity begins to fall off more sharply.

In nearly all of the discussions with price men here, either in or out of government, December looms up as the critical month.

Meantime, the tremendous world demand for fats and oils continues. United Nations officials say "it appears certain that the world fats and oils shortage will persist throughout 1948." Exports from the Far East as a whole aren't expected to reach prewar levels before the end of 1948.

The International Emergency Food Council says that world demand for fats and oils will increase rather than decrease.

"The entrance of Germany alone," says the IEFC, "into the world market would have far-reaching effects . . . A policy on the part of the occupation authorities to improve only moderately the German diet could mean an import demand which, if met, might make the position of the rest of the world even more critical than in 1947."

Price-wise, there is one sour note in the international outlook. It is that the world dollar supply is drying up.

Scarce dollars of foreign countries which badly need more fats and oils are to be used mainly for cereals, according to the most reliable information here.

Fats and oils, however, have second priority, and would be next to the last to feel the effects of a dropping off in exports.

The U. S. has an export balance of about 9 billion dollars. That is, it is selling abroad about 9 billion dollars worth of goods more than it buys.

U. S. foreign loans, though large, so far aren't enough to make up the difference. Foreign countries lack the dollars to bridge the gap, therefore are cutting down to the most essential imports which require dollars.

By PORTER M. HEDGE

Washington Correspondent for The Soybean Digest

The effect of this drying up process already is felt in exports of meats, dairy products, eggs, and fruits. Much of the export bloom also has been taken off the sugar market.

USDA officials are reluctant to speculate on how much the shortage of dollars is apt to affect U. S. fats and oils prices. Much depends upon the Army's buying policy and decisions not yet made on extension of further credits and tariff negotiations.

Those USDA Slashes

Senate farm bloc leaders stand a fair chance of restoring part of the cuts in the House-slashed farm appropriations bill.

But it's apt to be after July 1 before the outcome is known, since Senate action has been crowded up against the June 30 deadline.

This was the outlook for appropriations as *The Digest* went to press:

The $9½ million for farm marketing and research finally voted by the House ($6 million was the first recommendation) is pretty sure to stand. These are the funds to finance the Hope-Flannagan Act passed by the last Congress.

Half the money is earmarked for state experiment stations, the remainder for allocation by the Secretary of Agriculture.

State experiment station work should get under way immediately, but USDA is so demoralized by the budget cuts and internal dissension that congressional leaders do not expect as much from the program for a year or two as they visioned in passing the act.

The $40 million in tariff revenues finally voted by the House for price support purposes will be kept by the Senate.

AAA conservation funds for 1947 are likely to be increased over the $150 million voted by the House. AAA administrative funds, cut to the bone by the House, probably will be raised high enough to maintain state and county offices and a skeleton Washington staff.

It is improbable that funds for a 1948 AAA program will be voted, though there is strong sentiment for keeping the AAA organization of county and community

committeemen among Senate farm bloc leaders.

School lunch program money probably will be raised to about $60 million. The Senate will knock out the House-passed prohibition against use of school children payments as offsets to Federal funds.

The Federal crop insurance program will be given enough funds to liquidate in its present form, and there is a fair chance of the proposed new experimental program passing both Houses.

Varieties in South Development of new soybean varieties in the South is discussed in the new Department of Agriculture yearbook, *Science in Farming.*

A limited supply of the yearbook, first published since 1942, is available from the Superintendent of Documents, Washington 25, D. C. The price is $2.

The chapter on soybeans in the South is written by Paul R. Henson, agronomist at the U. S. Regional Soybean Laboratory at Stoneville, Miss.

He points out that soybeans have become a major crop in certain sections of the South—the coastal plains of North Carolina and Virginia, and the delta sections of Arkansas, Tennessee, Mississippi and Louisiana.

For the 10 years, 1934-43, the acreage of soybeans harvested as beans in the South was only 17.5 percent. In 1945, after several improved varieties became available, 27.6 percent of the total acreage was harvested for beans. The average yield of 13.8 bushels an acre increased 24 percent over the 10-year period.

Some of the more promising new strains of soybeans developed for the South include:

S100, adapted for the northern rim of the southern region; Odgen, for the central and upper part of the South; Volstate and Roanoke, both of late October maturity adapted to the mid-South areas, the Piedmont and coastal plain areas of North Carolina; CNS for the coastal plain soils of South Carolina, Georgia and Alabama; and Pelican, Acadian and L. Z., which appear to be promising for the lower South.

Loans on Soybeans The new system of handling crop loans may be extended, on an optional basis, to this year's crop of soybeans. The system works this way:

A producer simply "lists" with his county AAA committee the volume of soybeans he would like to have under government price protection.

He is given a certificate making all the soybeans eligible for price support. The certificate is good for a loan from a local bank, or the grower can take out a regular CCC loan if he chooses.

The details of sampling the beans, grading, testing for moisture, etc., are delayed until the producer actually is ready to deliver. If he doesn't deliver to the government, no samples are tested.

Under the new certificate plan, a producer can obtain price protection for all or part of his crop, but sell on the open market at any time he chooses without going through the "red tape" of actually negotiating a soybean loan.

The new plan is expected to cut administrative costs and in the case of grains to increase the volume handled by the trade.

Army Buys More Flour The Army has ordered 75,000 long tons of soy flour for June, July, and August delivery for civilian feeding in Japan, the Ryukyu Islands, and Korea.

Of the total, 62,500 long tons are for Japan proper and the Ryukyu Islands; the remainder for Korea. The Korean shipment, and 12,500 long tons of the Japan quota are a substitute for pulses.

TO MAKE LECITHIN

Manufacture of two types of lecithin from soybean oil was begun in May by A. E. Staley Manufacturing Co., pioneer U. S. soybean processing concern, at Decatur, Ill.

The food type is widely used in the baking, margarine and confectionery industries as an emulsifier to impart quality to products. A yellowish-brown, waxy material, it is used in practically any combination of oils or fats with other materials where there is difficulty in maintaining uniform distribution of the fatty material through the mass. Lecithin also retards oxidation and rancidity.

In announcing mass production of special types of lecithin for industrial uses, Staley's pointed out that lecithin has a large field for use in industrial products, such as in the manufacture of paints and related lines, tanning of leather, as an ingredient of creosoting material, in printing inks, soaps and in paper manufacture.

In The MARKETS

MAY MEAL MARKET STRONGER; OIL LOSES SOME GROUND

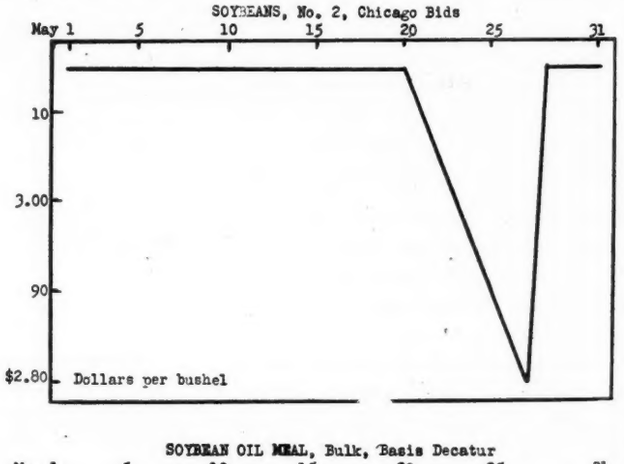
The May soybean oil meal market regained much of the ground it had lost in April; but soybean oil, reflecting the position of other fats and oils, lost another 3c during the month. There was no change in a largely nominal bean market during May.

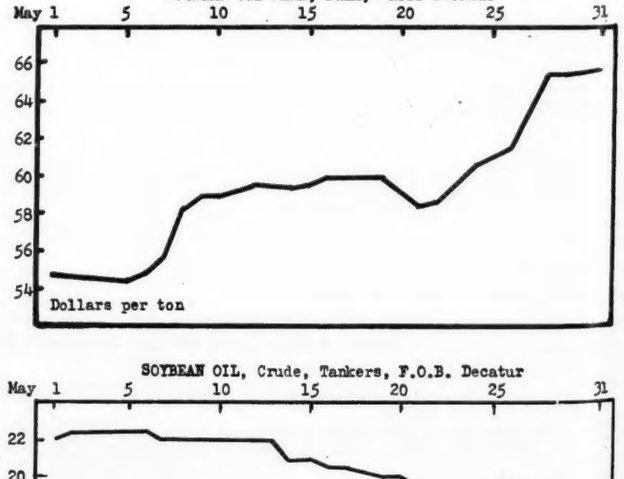
Factors in the stronger meal market were further allocations of protein feeds by the U. S. Department of Agriculture for shipment abroad; and announcement of purchase by the Army of 75,000 tons of soy flour for relief feeding in the Far East. The Army will buy 25,000 tons of soy flour per month in June, July and August. Another factor was the reversal of the downward price movement in mixed feeds brought about by the increased strength of ingredients. Mixed feed manufacturers were said to have only small stocks of soybean oil meal on hand.

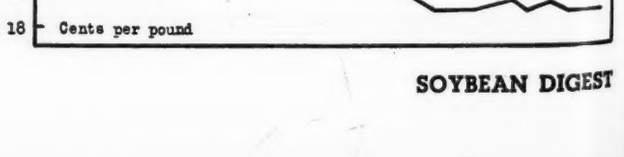
The Army purchases were expected to tighten up prospective supplies during the summer months. There was some concern about supplies for August and September, the last 2 months of the current season. Some large crushers were reported the latter part of the month to be buying rather than selling meal in order to sell soy flour to the Army and still take care of their regular oil meal customers.

Month's opening on bulk meal, Decatur basis was $54.75; the close $65.75.

Chicago bids for No. 2 yellow soybeans remained at $3.15 all month, with one bid of $2.80 reported May 27. Crushers were







said to be scouring the country for soybeans, but were able to secure only a limited amount at the $2.90 to $2.95 bid at country points.

Trading in soybean oil was at a near standstill the first 2 weeks of May, with no change in the New York futures market. Market was easier the last half of the month. Offerings were at times plentiful but buyers not actively interested, it was reported.

Highest price paid for crude oil in tankers F. O. B. Decatur, was 22½c May 2-6. Low point was 19c paid May 22-24 and May 29-31.

***Soybean Oil Meal Futures—Memphis, May 30**
Contract—100 tons

Decatur (sacked basis)		Decatur (bulk basis)	
July	$68.00@69.00	July	$64.50@66.00
October	60.50@63.00	October	56.00@59.00
December	57.50@59.00	December	53.50@56.00
January, 1948	56.50@58.50	January, 1948	52.00@55.00
March, 1948	54.00@56.00	March, 1948	51.00@53.00
May, 1948	53.00@56.00	Sales, none.	

*** N. Y. Soybean Oil Futures, May 30**

	Open	High	Low	Close	Pr. ct.
July	..	..	..	23.00	23.00
September	..	..	..	20.50	20.50
October	..	..	..	17.00	17.00
December	..	..	..	16.00	16.00
January, 1948	..	..	..	15.50	15.50
March, 1948	..	..	..	15.50	15.50
May, 1948	..	..	..	15.50	15.50

Total sales, none.

*Reported by Chicago Journal of Commerce

● CRUSHING AT RECORD LEVELS. Crushing of soybeans the first half of the 1946-47 season was the largest on record, reflecting the urgent demand for oil.

Despite the highest crushing rate on record, disappearance of soybeans in the first 6 months of the current season was 1 million bushels less than last year and amounted to 101 million bushels. This smaller disappearance was due largely to a 50 percent drop in the use of soybeans for feed.

Crushing of soybeans for oil, as reported by the Bureau of the Census, totaled 91,258,000 bushels the first half of the 1946-47 season. This is 6.6 million bushels more than was crushed in the same months of 1945-46 and 17.4 million bushels above the same months of 1944-45.

Exports of soybeans in the January-March quarter, amounting to a little over 500,000 bushels, were only about a fourth those of the previous quarter. Exports this season totaled 2.5 million bushels compared with 2.4 million bushels exported October through March 1945-46.

The quality of the 1946 crop is not as good as in previous years, according to inspectors' reports. Of the inspected receipts, October through March, 69 percent graded No. 2 or better this season compared with 92 percent last season and 87 percent the two previous seasons. Inspected receipts for the first 6 months of the season totaled 69,417 cars compared with 71,751 cars for the same months of last season and 62,000 cars the previous season.

● STOCKS APRIL 1. Stocks of soybeans stored in all positions, both on and off farms April 1 totaled about 100 million bushels, the Bureau of Agricultural Economics reports. This is over 2 million bushels above the April 1 stocks last year but 9½ million less than on April 1, 1945. Of the April 1 stocks this year, 42 million bushels were held in processing plants as enumerated by the Bureau of the Census; stocks of 25 million bushels, on farms, and of 19½ million in interior mills, elevators, warehouses, and other establishments were estimated by the crop reporting board; stocks at terminals were reported at 13½ million bushels by the Production and Marketing Administration.

It appears that as last year the available stocks will not be large enough to continue the current high rate of crushings for the next 6 months, even if the carryover at the end of the season is reduced to a minimum. About 17.5 million bushels of the 25 million bushels stored on farms as of April 1 will be required for seed if March planting intentions are carried out. Other uses, such as for feed, food, and export will further reduce the amount available for crushing for oil.

Stocks of Soybeans, April 1, 1947, With Comparisons

Position	Apr. 1, 1945	Apr. 1, 1946	Jan. 1, 1947	Apr. 1, 1947
	Thousand bushels			
On farms	27,773	29,872	36,591	24,966
Int. M. E. & Whses.[1]	30,012	18,087	36,322	19,633
Processing Plants	32,640	37,249	60,021	41,970
Terminals	16,508	12,666	21,704	13,689
Steel & Wooden Bins	2,762	25	0	0
Total All Positions	109,695	97,899	154,638	100,258

Stocks of Soybeans in Interior Mills, Elevators, and Warehouses[1] April 1, 1947, by States, With Comparisons

State	Apr. 1, 1946	Jan. 1, 1947	Apr. 1, 1947	State	Apr. 1, 1946	Jan. 1, 1947	Apr. 1, 1947
	Thousand bushels				Thousand bushels		
Ohio	1,351	2,610	985	Kans.	76	195	47
Ind.	2,486	2,742	1,449	Va.	21	49	48
Ill.	8,444	17,954	10,031	N. C.	81	75	28
Mich.	110	228	[2]	Miss.	25	72	25
Minn.	339	1,304	611	Other States	476	1,694	715
Iowa	4,678	9,399	5,694	U. S.	18,087	36,322	19,633

[1]Excludes stocks in processing plants enumerated by the Bureau of the Census and commercial stocks at terminals reported by the Grain Branch, P. M. A.

[2]Included in "Other States."

● WORLD FATS AND OILS. The world fats and oils supply situation, though still tight, is improving somewhat, reports the office of foreign agricultural relations of USDA.

Copra exports from the Philippines continued to be surprisingly large during the first quarter of this year.

Philippine copra production this year is estimated at 850 thousand tons, which is 150 thousand more than in 1946, and much more than the prewar average.

A substantial increase is expected in world flaxseed production this season compared with last year. North American prospects are especially good. Canadian Government assurance of a price of $5 per bushel for No. 1 seed—$1.75 more than last year—is designed to encourage farmers to reach a production goal of from 12 to 15 million bushels in the Dominion.

A big increase in flaxseed acreage in this country is indicated. Flaxseed crop prospects also are good in Mexico, and that country is likely to have a small exportable surplus.

India's flaxseed crop, harvested in March and April, has been estimated at below average, however. South America is an important source of flaxseed. Argentina's planting of the important oilseed crop may show a drop compared with the previous year, but Uruguay is expected to plant at least as much as in 1945-46.

● APRIL INSPECTIONS. Inspected receipts of soybeans in April continued to increase and totaled 5,852 cars compared with 4,172 cars in March and 2,681 cars in February, according to inspectors' reports to the grain branch of the Production and Marketing Administration. The April average for the crop years 1940-45 was 4,323 cars. Inspected receipts October through April this season were 75,269 cars compared with 76,252 cars for the same period last year.

The quality of the soybeans inspected in April was higher than for the preceding month, 76 percent grading No. 2 or better compared with 64 percent in March and 58 percent in February.

Inspections of soybeans in April included truck receipts equivalent to about 14 cars.

● ALLOCATIONS. The U. S. Department of Agriculture has announced the allocation of 34,600 pounds of edible soybeans to the Republic of the Philippines; and 315,000 pounds of margarine, 521,000 pounds of shortening and 65,000 pounds of soybean oil to voluntary foreign relief agencies.

USDA has announced emergency allocations of 5,000 long tons of protein meal to the Netherlands and 5,000 long tons to Sweden. These allocations will be in effect the first 6 months of 1947.

● STANDARD SHORTENING SHIPMENTS. Reported by members of Institute of Shortening Mfgrs, Inc., in pounds.

Week Ending	
May 10	2,062,594
May 17	2,373,978
May 24	2,302,938
May 31	2,439,849